University of Alberta

Exploring the food environment of the University of Alberta

by

Leia Michelle Minaker

A thesis submitted to the Faculty of Graduate Studies and Research
in partial fulfillment of the requirements for the degree of

Master of Science

Centre for Health Promotion Studies

Edmonton, Alberta
Fall 2006

Library and Archives Canada

Published Heritage Branch

395 Wellington Street
Ottawa ON K1A 0N4
Canada

Bibliothèque et Archives Canada

Direction du Patrimoine de l'édition

395, rue Wellington
Ottawa ON K1A 0N4
Canada

Your file Votre référence
ISBN: 978-0-494-22324-6
Our file Notre référence
ISBN: 978-0-494-22324-6

NOTICE:
The author has granted a non-exclusive license allowing Library and Archives Canada to reproduce, publish, archive, preserve, conserve, communicate to the public by telecommunication or on the Internet, loan, distribute and sell theses worldwide, for commercial or non-commercial purposes, in microform, paper, electronic and/or any other formats.

The author retains copyright ownership and moral rights in this thesis. Neither the thesis nor substantial extracts from it may be printed or otherwise reproduced without the author's permission.

AVIS:
L'auteur a accordé une licence non exclusive permettant à la Bibliothèque et Archives Canada de reproduire, publier, archiver, sauvegarder, conserver, transmettre au public par télécommunication ou par l'Internet, prêter, distribuer et vendre des thèses partout dans le monde, à des fins commerciales ou autres, sur support microforme, papier, électronique et/ou autres formats.

L'auteur conserve la propriété du droit d'auteur et des droits moraux qui protège cette thèse. Ni la thèse ni des extraits substantiels de celle-ci ne doivent être imprimés ou autrement reproduits sans son autorisation.

In compliance with the Canadian Privacy Act some supporting forms may have been removed from this thesis.

While these forms may be included in the document page count, their removal does not represent any loss of content from the thesis.

Conformément à la loi canadienne sur la protection de la vie privée, quelques formulaires secondaires ont été enlevés de cette thèse.

Bien que ces formulaires aient inclus dans la pagination, il n'y aura aucun contenu manquant.

Canada

Abstract

The obesity epidemic in Canada, particularly among adults and adolescents, continues to intensify. Researchers and policy makers have begun to acknowledge the contexts within which individual choices are made, including the food environment within which one lives and works. Recently, conceptual models of the food environment have been proposed, but tools to assess the food environment are still lacking. The current, mixed-methods study assessed the food environment of the University of Alberta and developed and tested a comprehensive series of assessment tools. The food environment at the University of Alberta is described and implications for future research are discussed.

TABLE OF CONTENTS

1 INTRODUCTION 1

1.1 BACKGROUND 1
1.2 PURPOSE 2
1.3 OBJECTIVES 3

2 LITERATURE REVIEW 4

2.1 OBESITY IN CANADA 4
2.2 OBESITY AND FOOD INTAKE 5
2.3 ECOLOGICAL MODEL OF FOOD CHOICE 8
2.3.1 Historical View of Food Choice: 8
2.3.2 An Ecological Perspective on Health Promotion 10
2.4 POPULATION-LEVEL DETERMINANTS OF FOOD CHOICE 13
2.4.1 Food Availability and Food Intake 14
2.4.2 Food Affordability and Food intake 16
2.4.3 Food Policies and Food Intake 17
2.4.4 Food Advertising and Food Intake 21
2.4.5 Nutrition Information 23
2.5 CURRENT ILLUSTRATIONS OF DETERMINANTS OF FOOD CHOICE 24
2.5.1 At the Level of the Community 24
2.5.2 At the Level of Evaluation 26
2.6 POST-SECONDARY INSTITUTIONS AS A MICROCOSM OF SOCIETY 27
2.7 CONCEPTUAL MODELS OF THE FOOD ENVIRONMENT 29
2.8 SUMMARY 33

3 METHODS 34

3.1 SETTING 34
3.2 ASSESSMENT TOOLS 35
3.2.1 Community Nutrition Environment 35
3.2.2 Organizational Nutrition Environment 37
3.2.3 University of Alberta Policies 38
3.2.4 Information Environment 39
3.2.5 Consumer Nutrition Environment 40
3.3 DATA ANALYSIS 47
3.3.1 Community Nutrition Environment 47
3.3.2 Organizational Nutrition Environment 48
3.3.3 University of Alberta Policies 48
3.3.4 Information Environment 49
3.3.5 Consumer Nutrition Environment 50
3.4 SUMMARY 51

4 RESULTS AND DISCUSSION 53

4.1 COMMUNITY NUTRITION ENVIRONMENT 53
4.1.1 Weekday hours of operation by type of location: 54
4.1.2 Weekend hours of operation by type of location: 56
4.1.3 Community Nutrition Environment: Summary and Interpretation 56
4.2 ORGANIZATIONAL NUTRITION ENVIRONMENT 57
4.2.1 Students' Union General Survey 58
4.2.2 Senate Task Force on Wellness, 2003 61
4.2.3 Organizational Nutrition Environment: Summary and Interpretation 62
4.3 FOOD-RELATED POLICIES 63
4.3.1 Students' Union 64
4.3.2 Aramark 66
4.3.3 University of Alberta 68

4.3.4 *Exclusive Pouring Rights Contract* ... 72
4.3.5 *Food-Related Policies: Summary and Interpretation* ... 74
4.4 INFORMATION ENVIRONMENT ... 80
4.4.1 *Student Newspaper* ... 80
4.4.2 *Undergraduate Handbook* ... 82
4.4.3 *Graduate Handbook* ... 83
4.4.4 *Student Radio Station* ... 84
4.4.5 *Information Environment: Summary and Interpretation* ... 84
4.5 CONSUMER NUTRITION ENVIRONMENT ... 86
4.5.1 *Food Availability* ... 86
4.5.2 *Food Affordability* ... 100
4.5.4 *Food Affordability: Summary and Interpretation* ... 105
4.5.5 *Food Promotion within Food Outlets* ... 108
4.5.6 *Food Promotion within Food Outlets: Summary and Intepretation* ... 112
4.5.7 *Nutrition Information* ... 114
4.5.8. *Nutrition Information: Summary and Interpretation* ... 119
4.6 SUMMARY OF OUTLET TYPE CHARACTERISTICS ... 120
4.6.1 *Convenience* ... 120
4.6.2 *Cost/Value* ... 121
4.6.3 *Health* ... 122
4.6.4 *Advertising* ... 123
4.6.5 *Food Promotion within Food Outlets* ... 124
4.6.6 *Summary of Outlet Type Characteristics: Summary and Interpretation* ... 125

5 CONCLUSIONS ... 127

5.1 MAIN CONCLUSIONS ... 127
5.1.1 *Restatement of Purpose* ... 127
5.1.2 *Restatement of Objectives* ... 127
5.1.3 *Development of Assessment Tools* ... 128
5.2 GENERAL CONCLUSIONS ... 129
5.3 LIMITATIONS ... 131
5.3.1 *Setting* ... 131
5.4 FUTURE DIRECTIONS ... 134
5.4.1 *Measures* ... 134
5.4.2 *Implications for Future Research* ... 134

REFERENCES ... 137

APPENDIX A ... 156

APPENDIX B ... 158

APPENDIX C ... 159

APPENDIX D ... 165

LIST OF TABLES

TABLE 1: RANGES OF POPULATION NUTRIENT INTAKE GOALS (WHO, 2003) 7

TABLE 2. DATA COLLECTION TABLE FOR INFORMATION ENVIRONMENT 39

TABLE 3: DATA COLLECTION TABLE FOR FOOD AVAILABILITY 44

TABLE 4: DATA COLLECTION TABLE FOR FOOD AFFORDABILITY 45

TABLE 5: DATA COLLECTION TABLE FOR ADVERTISEMENTS 47

TABLE 6: DATA COLLECTION TABLE FOR NUTRITION INFORMATION 47

TABLE 7: NUMBER AND PROPORTION OF FOOD OUTLETS ON CAMPUS 54

TABLE 8: WEEKDAY AND WEEKEND HOURS OF OPERATION BY OUTLET TYPE. 55

TABLE 9: CATEGORIES OF HOURS OF OPERATION BY OUTLET TYPE 56

TABLE 10: STUDENTS' PERCEPTIONS OF REASONABLE FOOD PRICING ON CAMPUS 59

TABLE 11: STUDENTS' PERCEPTIONS OF THE AVAILABILITY OF HEALTHY FOOD ON CAMPUS 60

TABLE 12: SUMMARY OF POLICIES ADDRESSING THE FOOD ENVIRONMENT .. 64

TABLE 13: SUB TENANTS AND CORRESPONDING MARKET NICHES 66

TABLE 14: RESIDENCE MEAL PLAN OPTIONS AS DESCRIBED BY UNIVERSITY OF ALBERTA RESIDENCE SERVICES 68

TABLE 15: HUB MALL TENANTS AND CORRESPONDING MARKET NICHES 69

TABLE 16: MONETARY DONATIONS TO THE UNIVERSITY OF ALBERTA COMMUNITY FROM COCA-COLA BOTTLING LTD. BETWEEN JUNE 1998 AND MAY 2005[1] 72

TABLE 17: STUDENT NEWSPAPER ADVERTISEMENTS - TYPE, NUMBER, AND SIZE 81

TABLE 18: BAR AND NIGHT-CLUB ADS SECONDARY SUBJECTS 82

TABLE 19: UNDERGRADUATE HANDBOOK ADVERTISEMENTS: TYPE, NUMBER AND SIZE 83

TABLE 20: GRADUATE HANDBOOK ADVERTISEMENTS: TYPE AND SIZE 84

TABLE 21: WAIT TIMES BY TYPE OF FOOD OUTLET 88

TABLE 22: PROPORTION OF HEALTHY MEALS, SIDES AND BEVERAGES BY TYPE OF OUTLET 89

TABLE 23: MEAN NUMBERS AND RANGES OF HEALTHY AND UNHEALTHY MAIN MEALS BY TYPE OF OUTLET 91

TABLE 24: MEAN NUMBERS AND RANGES OF HEALTHY AND UNHEALTHY SNACKS AND SIDES BY TYPE OF OUTLET 92

TABLE 25: MEAN NUMBERS AND RANGES OF HEALTHY AND UNHEALTHY BEVERAGES BY TYPE OF OUTLET 93

TABLE 26: PROPORTION OF OUTLETS OFFERING HEALTHIER PREPARATION OPTIONS 97

TABLE 27: MEAN PROPORTION OF ESTABLISHMENTS SELLING SPECIFIC ITEMS 98

TABLE 28: RANK OF OUTLET TYPES ACCORDING TO THE AVAILABILITY OF SPECIFIC FOODS 99

TABLE 30: FOOD OUTLET COMPARISON OF MEAN ENERGY COST ($/100KCAL) OF TYPICAL FOODS 102

TABLE 31: TYPE OF FOOD COMPARISON OF MEAN ENERGY DENSITY (KCAL/G) 103

TABLE 32: TYPE OF FOOD COMPARISON OF MEAN ENERGY COST ($/100KCAL) 105

TABLE 33: NUMBER AND PROPORTION OF DIFFERENT ADVERTISEMENT TYPES BY TYPE OF OUTLET 109

TABLE 34: ADVERTISEMENT SIZE AND PROPORTION OF SUBJECT MATTER ... 111

TABLE 35: NUTRITION-RELATED MENU LABELS BY TYPE OF OUTLET 115

TABLE 36: AVERAGE PROPORTION OF ITEMS LABELED USING VARIOUS LABELS 116

TABLE 37: PROPORTION OF OUTLETS WITH NUTRITION INFORMATION AVAILABLE 118

TABLE 38: SUMMARY OF CONVENIENCE INDICES BY TYPE OF OUTLET 121

TABLE 39: SUMMARY OF COST/VALUE INDICES BY TYPE OF OUTLET 122

TABLE 40: SUMMARY OF HEALTH INDICES BY TYPE OF OUTLET 123

TABLE 41: SUMMARY OF ADVERTISING INDICES BY TYPE OF OUTLET 124

TABLE 42: SUMMARY OF FOOD PROMOTION INDICES BY TYPE OF OUTLET ... 125

LIST OF FIGURES

FIGURE 1: CONCEPTUAL MODEL OF FOOD ENVIRONMENTS..... 32

1 Introduction

1.1 Background

The obesity epidemic in Canada, particularly among adults and adolescents, continues to intensify (Statistics Canada, 2005a). Although the basic cause of obesity is recognized as a prolonged energy imbalance, with energy intake exceeding energy output, not enough is known about factors that influence either side of the equation. Until recently, the predominant perspective on obesity, like many other chronic health issues, was individual-centric. The main tenet of this "victim-blaming approach" (Labonte, 1994; Labonte & Penfold, 1981) is the individual's responsibility for his or her condition due to their "poor lifestyle choices." Specifically, in the case of obesity, individuals are blamed for their unhealthy food choices and lack of physical activity. More recently, researchers and policy makers have begun to acknowledge the contexts within which individual choices are made. Food choice, for example, is influenced by governmental and industry policies, organizational environments (within schools, work places and homes, for instance), cultural influences, the media, one's socio-economic status all play a role in food choice, in addition to the more obvious individual factors such as taste preferences.

Although there has been much research on population-level determinants of food choice, such as food availability, food affordability, food advertising and food-related policies, the majority of work has been disconnected, dealing with one

influence at a time. This gap in the literature has prompted some researchers to develop conceptual models of the food environment[1] (Glanz, Sallis, Saelens & Frank, 2005; Swinburn, Egger & Raza, 1999) that attempt to integrate, at least conceptually, various influences on food choice. The conceptual models provide a comprehensive view of why different individuals make different food choices.

1.2 Purpose

Since these models are so recent, few food environments have been assessed, and a standard food environment assessment tool has not yet been developed. The current study aims to address this gap in the literature by assessing the food environment of a community setting (specifically, the University of Alberta) and to develop a comprehensive tool or series of tools that will measure the food environment of the proposed setting.

The current study uses a recently published conceptual model of the food environment as well as existing literature to inform the development of a comprehensive method by which to assess the food environment. The literature was searched for articles exploring influences on food choice. Several important themes emerged from the literature search, including the impact on food choice of food affordability, food availability, food-related policies, food advertising and the availability of nutrition information. Thus, the tools were developed with a strong theoretical and conceptual basis.

---

[1] The food environment, for the purpose of the current study, may be defined as the compilation of factors at a variety of levels that affect individual food choice.

1.3 Objectives

The objectives of the current study are as follows:

1) To describe the food environment of the University of Alberta.

2) To develop a series of tools that will adequately describe the food environment of the University of Alberta.

2 *Literature Review*

2.1 Obesity in Canada

Data from the 2004 Canadian Community Health Survey (CCHS) suggest that the prevalence of overweight and obesity continues to climb, especially among adolescents and adults (Statistics Canada, 2005a). The CCHS, which directly measured the height and weight of respondents, found that the prevalence of overweight among adolescents aged 12-17 years has more than doubled from 14% to 29% since 1978. The obesity rate in the same group tripled from three to nine percent during the same time period. That almost one-third of adolescents are overweight is particularly concerning, given that overweight and obesity tend to track into adulthood (Kelder, Perry, Klepp & Lytle, 1994).

In 2004, approximately 6.8 million Canadian adults ages 20 to 64 were overweight, and an additional 4.5 million were obese (Statistics Canada, 2005c). 59% of Canadian adults are overweight (65% of adult men and 52% of adult women). Of these, 23% of adult men and 23% of adult women are obese (Library of Parliament, 2005).

The high prevalence of obesity in Canada is associated with increasing morbidity (Katzmarzyk & Janssen, 2004) and mortality (Katzmarzyk & Ardern, 2004). Overweight and obesity are associated with many comorbidities, including cardiovascular disease, some types of cancers, and type 2 diabetes (World Health Organization [WHO], 2003).

The obesity pandemic is not only concerning in terms of the number of Canadians affected and the negative health outcomes associated with the disease, but also in terms of cost to society (Birmingham, Muller, Palepu, Spinelli & Anis, 1999; Katzmarzyk & Janssen, 2004). A conservative estimate of the total direct cost of overweight and obesity in Canada in 1997 was $1.8 billion with estimates ranging up to $3.5 billion (Birmingham et al., 1999). More recent estimates suggest that the economic burden of obesity is $4.3 billion, including $1.6 billion of direct costs and $2.7 billion of indirect costs (Katzmarzyk & Janssen, 2004). Given that almost two-thirds of Canadians are at increased risk of disability, disease and premature death due to overweight and obesity, it has been estimated that 2.2% of all Canadian health care dollars have been allocated to the treatment of obesity and the comorbidities associated with obesity (Katzmarzyk & Janssen, 2004).

2.2 Obesity and Food Intake

The World Health Organization (WHO) released a comprehensive report on diet, nutrition and chronic disease in 2003 (see Table 1 for a summary of ranges of population nutrient intake goals). The report explored food, energy, and nutrient availability in a global context, and reported that populations in industrialized nations such as Canada have more food, energy, and nutrients available per capita than developing or transitioning countries. Not surprisingly, the report indicated that a population's food, energy and nutrient consumption is directly related to their availability, such that populations from industrialized countries have higher intakes of food, energy and nutrients than populations from developing or

transitioning countries. Because of this, and due to decreasing physical activity demands in industrialized countries, the prevalence of overweight and obesity are higher in industrialized countries than in developing or transitioning countries (WHO, 2003). Although the exact contributions of energy intake (e.g. food consumption) and energy output (e.g. through physical activity) to the obesity epidemic remain unknown, the high availability and affordability of energy-dense foods in industrialized countries have led obesity researchers to conclude that industrialized food environments can be considered "toxic" (Brownell & Horgen, 2004).

Table 1: Ranges of population nutrient intake goals (WHO, 2003)

Dietary factor	Goal (% of total energy, unless otherwise stated)
Total fat	15-30%
Saturated fatty acids	<10%
Polyunsaturated fatty acids (PUFAs)	6-10%
n-6 Polyunsaturated fatty acids (PUFAs)	5-8%
n-3 Polyunsaturated fatty acids (PUFAs)	1-2%
Trans fatty acids	<1%
Monounsaturated fatty acids (MUFAs)	By difference[a]
Total carbohydrate	55-75%[b]
Free sugars[c]	<10%
Protein	10-15%[d]
Cholesterol	<300 mg per day
Sodium chloride (sodium)[e]	<5 g per day (<2 g per day)
Fruits and vegetables	⩾400 g per day
Total dietary fibre	> 20g per day
Non-starch polysaccharides (NSP)	> 25g per day

[a] This is calculated as: total fat - (saturated fatty acids + polyunsaturated fatty acids + trans fatty acids).
[b] The percentage of total energy available after taking into account that consumed as protein and fat, hence the wide range.
[c] The term "free sugars" refers to all monosaccharides and disaccharides added to foods by the manufacturer, cook or consumer, plus sugars naturally present in honey, syrups and fruit juices.
[d] The suggested range should be seen in the light of the Joint WHO/FAO/UNU Expert Consultation on Protein and Amino Acid Requirements in Human Nutrition, held in Geneva from 9 to 16 April 2002 (*2*).
[e] Salt should be iodized appropriately (*6*). The need to adjust salt iodization, depending on observed sodium intake and surveillance of iodine status of the population, should be recognized.

The WHO based its nutrition recommendations on evidence referred to as convincing evidence: "based on epidemiological studies showing consistent associations between exposure and disease, with little or no evidence to the contrary" (p. 54) and; probable evidence: "based on epidemiological studies showing fairly consistent associations between exposure and disease, but where there are perceived shortcomings in the available evidence or some evidence to the contrary, which precludes a more definite judgment" (p. 55).

Given the WHO recommendations, it is troubling that Canadians continue to consume an inadequate and decreasing amount of vegetables (Statistics Canada, 2005b). For all Canadians, consuming five or more servings of fruits and vegetables per day is associated with lower rates of overweight and obesity. It is troubling, then, that only 41% of children and adolescents reported consuming fruits and vegetables at least five times per day (Statistics Canada, 2005a). The amount of fresh fruit eaten in Canada has increased slightly from 37.1 kg per person in 2003 to 37.6 kg per person in 2004 (Statistics Canada, 2005b). Use of oils and fats continued to rise from 23.0 kg per person in 2003 to 23.6 kg per person in 2004. A large proportion of these products are consumed in the form of salad oils, shortening, deep-fried products and baked goods (Statistics Canada, 2005b). Such nutrition behaviors in Canada may be contributing to the burgeoning obesity epidemic.

2.3 Ecological Model of Food Choice

2.3.1 Historical View of Food Choice:

Nutrition education emerged out of home economics, a discipline that uses an ecological approach to enhance the quality of people's lives (Travers, 1997). As the scientific foundation of the discipline expanded, nutrition educators became increasingly interested in using scientific knowledge to develop nutrition recommendations for the public. The focus on disseminating nutrition messages continued to grow, along with the belief that instrumental knowledge is sufficient

for individuals to maintain a healthy diet (Travers, 1997). The foundation of the historical public health approach to dietary change rested on the premise that individual consumers will discard those dietary behaviours shown to be unhealthy in order to prevent future illness (Nestle et al., 1998a). Indeed, the ideology of individual responsibility for poor diet and obesity pervades public opinion and is a prevalently held view in America. Recent public opinion polls report that up to 90% of those questioned attribute obesity to individual behaviour alone (Oliver & Lee, 2002).

A multitude of interventions and assessment techniques have been developed under the paradigm of individual responsibility. These interventions and assessment tools evidence the pervasive nature of the individual focus in the discipline of nutrition. Although many of these interventions have been successful on a small scale, most have targeted individual behaviours, focused on a single setting (for example, schools or workplaces) and addressed only a single risk factor for chronic disease (Richter et al., 2000). Similarly, diet assessment techniques have addressed such intrapersonal questions as, "what foods and nutrients are being consumed?" and "what is the bioavailability of the nutrients that have been consumed?" (Lytle & Fulkerson, 2002, p.894). The abundance of such interventions and the high prevalence of appropriate tools with which to gauge their success have not resulted in the population adopting a healthier diet. Clearly, the exclusive focus on individual behaviour is inadequate to fully explain diet choice.

The traditional focus on individual behaviour change strategies, including interventions and assessment methods, is insufficient both for understanding food choice and for changing food behaviours. As Travers (1997) notes, focusing on individual responsibility and ignoring the social and structural context in shaping behaviours implies a separation between individuals and their environment. Further criticising the notion that behaviours are solely a matter of individual discretion, Crawford (1979) claims that such ideologies inhibit the understanding of the behaviour in question and instead lead to the development of unrealistic behavioural models. Crawford (1979) notes that the focus on individuals, "both ignores what is known about human behaviour and minimizes the importance of evidence about the environmental assault on health" (p. 256). From an ecological perspective, it is innately difficult, if not impossible, to separate the individual from his or her social, cultural, physical and political environments. Proponents of the ecological model recognize that behaviour is affected by, but also affects, these environments (Booth et al., 2001; Drewnowski & Rolls, 2005; Glanz, et al., 2005; McLeroy, Bibeau, Steckler & Glanz, 1988; Story, Neumark-Sztainer & French, 2002)

2.3.2 An Ecological Perspective on Health Promotion

The ecological approach to health promotion, proposed by McLeroy et al. (1988), was an attempt to reconceptualize health behaviors. In this perspective, health behaviors are viewed as determined by intrapersonal factors (including

knowledge, attitudes, behavior and skills), interpersonal processes and primary groups (including family, work groups and friendship networks), institutional factors (including social institutions with organizational characteristics and the rules that regulate their operation), community factors (including relationships among organizations, institutions, and informal networks within a given boundary), and public policy (including local, provincial and national policies). At its most basic level, "an ecological approach to health promotion examines people's opportunities to choose" (Lewis et al., 2005, p. 668). When health behaviors such as diet and physical activity are contextualized within this model, obesity may be viewed as a "'settling point' – the net result of multiple influences which impact on fat mass by acting through the mediators of energy intake (especially energy-dense food) and/or energy expenditure (especially physical activity)" (Swinburn et al., 1999, p. 564). Similarly, Glanz et al. (2005) note that "environmental effects can be moderated or mediated by demographic, psychosocial, or perceived environment variables. Environmental, social and individual factors influence eating patterns, which in turn affect risk of many chronic diseases" (p.331). In other words, obesity results from interactions between biological factors and different types of environments, including the physical, social and economic environment (Drewnowski & Rolls, 2005). Notably, environmental factors do not solely interact with biological factors, but such elements interact with one another, such that behavior depends on different environmental influences at different levels (Booth et al., 2001). Inherent in ecological approaches to health behavior is the

notion that interventions to change behavior will be most successful when they are undertaken on multiple levels: individual, social, cultural, environmental, and political (Booth et al., 2001).

Recent literature has reinforced the need to view health behaviors, including food choice, as contextualized within an ecological model (Booth et al., 2001; Drewnowski & Rolls, 2005; Glanz et al., 2005; Lewis et al., 2005; Story et al., 2002; Swinburn et al., 1999). Given that the majority of nutrition interventions and research have been conducted at an individual level and the obesity epidemic continues to grow, there has been an increased focus on mechanisms by which the food environment influences food choice (Bauer, Yang, & Austin, 2004; Lytle & Fulkerson, 2002; Richter et al., 2000; Story et al., 2002; Wechsler, Devereaux, Davis, & Collins, 2000). As Bauer et al. (2004) note, "interventions that target the environment may be more efficient and potentially more effective than individually targeted interventions because they are designed to change the context in which people live and work to create conditions more supportive of healthful behavioral choices." (p. 35). Similarly, Lytle and Fulkerson (2002) argue for an increased focus on "upstream" approaches. They note that "the healthfulness of our 'food environments' (which may include food availability, social norms around food choice and the effect of pricing, policy and promotion on food choice) may be more important in determining what people consume than their individual decision-making about food choice" (p. 893). Wechsler et al. (2000) suggest that environmental interventions can be less costly and more

effective since they reach a much wider audience. Indeed, regardless of the strength of the environmental influences, they influence large segments of the population on a daily basis and thus are important to consider (Booth et al., 2001; Nestle et al., 1998b). Since environmental interventions do not require voluntary and sustained effort by targeted individuals, they may be more successful than other interventions that depend on individuals resisting their environment for a sustained period of time.

2.4 Population-level Determinants of Food Choice

A multitude of factors have been explored to explain why people choose the foods they do. In a large, population-based study, taste and cost were found to be the most important determinants of food choice (Glanz, Basil, Maibach, Goldberg, & Snyder, 1998). Convenience, nutrition and weight control were also significant determinants of food choice, but varied significantly by demographic and health lifestyle differences (Glanz et al., 1998). Broader influences on food choice have also been examined in the health literature, including socio-economic status (Drewnowski, 2004; Drewnowski & Darmon, 2005a), food marketing (French, Story, & Jeffery, 2001; Story et al., 2002), nutrition labeling (French et al., 2001), overarching societal influences (Booth et al., 2001) and recent changes in food production, distribution and processing (Nestle, 2000a). The economic literature is rife with examples of population-level determinants of food choice, including agricultural policies and the food industry (see, for example, Alston, Sumner & Vosti, 2006; Cash, Goddard & Lerohl, 2006; Lobstein, 1998). Outcomes of these

determinants that affect obesity, such as snack consumption (Kant, 2000), fast food consumption (French et al., 2001), caloric beverage consumption (Harnack, Jeffery & Boutelle, 2000), eating away from home (Lin, Guthrie & Frazao, 1999) and growing portion sizes (Nielsen & Popkin, 2003; Young & Nestle, 2003) have also been examined.

Considering the evidence, it is apparent that an ecological approach to health behavior can help enrich our understanding of food choice over an individualist behavior-change approach. The environment must be taken into account when attempting to change food behaviors at a population level.

2.4.1 Food Availability and Food Intake

The impact of food availability on food intake has been studied relatively extensively in elementary and high schools compared with other settings. Students from schools with higher access to a la carte programs, snack bars, vending machines and less healthy lunch items had lower intakes of fruits and vegetables and higher dietary fat intakes than students with lower access (Cullen, Eagan, Baranowski, Owens & de Moor, 2000; Kubik, Lytle, Hannan, Perry & Story, 2003). Young and Nestle (2003) also reported that the school environment influences food choices of youth. As students progress from elementary school to high school, the number of unhealthy food choices with which they are presented increases dramatically (Story et al., 2002). Increased availability of unhealthy foods and beverages may encourage students to consume excess energy (French

et al., 2001; French, Story, Fulkerson & Gerlach, 2003). Conversely, simultaneously increasing the variety of healthy foods and decreasing prices of such foods positively affected food choices in a cafeteria setting (Jeffery, French, Raether & Baxter, 1994).

The current North American environment provides frequent opportunities for the consumption of large quantities of food (Hill & Peters, 1998). Geographic accessibility of food has been related to neighborhood characteristics such that fast food restaurants were found to be more prevalent in low-income and minority neighborhoods (Block, Scribner, & DeSalvo, 2004). Availability of a wide variety of healthy foods at reasonable prices and the presence of health-education items were associated with higher education and income levels of residents (Cheadle et al., 1991; Morland, Wing, Diez Roux & Poole, 2002). Reidpath, Burns, Garrard, Mahoney and Townsend (2002) summarize, "The social determinants (SES) and environmental determinants (density of fast-food outlets) interact to create environments in which the poor have increased exposure to energy-dense foods" (p. 143). Food availability varies between higher and lower income neighborhoods. Correspondingly, diets of residents have been found to correlate to their food environment, particularly among lower income and minority populations (Cheadle et al., 1991; Cheadle et al., 1993; Morland, Wing, & Diez Roux, 2002; Morland et al., 2002). A potential reason for this phenomenon, offered by Morland, Wing and Diez Roux (2002), is that white and higher-income Americans tend to have greater access to private transportation, which allows

them to select food outlets from a larger geographic area. White and higher-income Americans may therefore be less reliant than others on their immediate neighborhood for food.

2.4.2 Food Affordability and Food intake

Population research on food cost, energy cost and pricing intervention research has confirmed the impact of food affordability on food intake. At a population level, there is an inverse relationship between the energy density of foods (kilocalories per gram) and energy cost (dollars per kilocalorie), resulting in the fact that diets high in refined grains and added fats and sugars are more affordable than the recommended diets based on whole grains, fresh vegetables and fruits and lean meats and dairy (Drewnowski, 2004). In other words, healthy diets cost more than unhealthy diets (Darmon et al., 2004; Drewnowski & Darmon, 2005a; Drewnowski & Darmon, 2005b; Drewnowski & Levine, 2003; Drewnowski & Rolls, 2005). Drewnowski et al. (2004) found that as fat and sweet consumption increased, diet costs were reduced. Conversely, as vegetable and fruit consumption increased, diet costs increased. It seems logical, therefore, that diet costs are a likely barrier to healthy eating among minority communities and lower-income people (Drewnowski & Rolls, 2005), particularly since food expenditure restriction encourages leads to more energy-dense diets and may lead to overweight and obesity (Drewnowski & Darmon, 2005b). On a national and international scale, it has been suggested that the greater affordability of food contributes to excess consumption (French et al., 2001).

In a number of studies conducted in various microenvironmental settings and with different audiences, decreasing the cost of targeted "healthy foods" consistently resulted in increased consumption, regardless of visual promotion (French, Story et al., 1997; French, Jeffery, Story, Hannan, & Snyder, 1997; French et al., 2001; French et al., 2003; French, 2003; Jeffery et al., 1994). Because of the consistency of these findings, French et al. (1997) suggest that adolescents can be encouraged to choose healthier foods by reducing the prices of such foods, in contrast to many nutrition education programs in which the effects on behavior are less clear. French (2003) proposes a strategy to simultaneously increase consumption of healthy foods and decrease consumption of unhealthy foods. The proposed strategy would implement small price increases on popular high fat foods and modest price reductions on lower fat foods, resulting in a potentially financially feasible, long-term strategy to promote healthful food choices.

Based on the impact of food availability and affordability on food intake, Hill and Peters (1998) suggest that, to combat the obesity epidemic, "foods that are naturally low in fat and energy density, such as fruits, vegetables, and whole grains, should be made easily available and affordable in both restaurants and grocery stores" (p. 1373).

2.4.3 Food Policies and Food Intake

Policies may be defined as "legislative, regulatory, or policymaking actions that

have the potential to affect health behaviors, sometimes unintentionally; policies are sociocultural influences that can alter physical environments" (Sallis & Owen, 2002). Food-related policies may affect both food availability and affordability (Nestle & Jacobson, 2000). Because policies affect everyone in the population, they can influence large numbers of people, regardless of the strength of their influence. For example, school or worksite food policies that determine the type of food served in such institutions affect all students or employees on a regular basis (Booth et al., 2001). French, Story and Fulkerson (2002) advocate for integrated, comprehensive food policies, such as guidelines for foods and beverages sold in schools (including vending machines and cafeterias), food sold at fundraising events, food rewards, food and beverage advertising, and product giveaways. As these policies are implemented, research should be done to determine the extent to which such policies are implemented and enforced and their impact on food choices (French & Wechsler, 2004; Taylor, Evers & McKenna, 2005).

Several policy-related interventions have been proposed to improve the current food environment. Before considering specific interventions, however, it is important to note that public policy interventions must be grounded in reliable nutritional and behavioral science (Drewnowski & Rolls, 2005). In addition, such interventions must also be publicly supported. For example, recent data suggest that there are high levels of support among parents and teachers for increasing the availability of healthy food choices in schools (Kubik, Lytle, & Story, 2005).

Nestle and Jacobson (2000) report that the American public would support taxes on unhealthy foods if they did not place undue burden on the poor and if they supported health-promotion campaigns.

Healthy public food policy interventions have the general aim of restricting or limiting the consumption of energy-dense, high-fat or high-sugar foods (Drewnowski & Levine, 2003). At the most broad level, the WHO has stated that an affordable supply of fresh, nutrient-rich foods is the key to maintaining a healthy weight at a population level (Fried & Nestle, 2002). Drewnowski and Darmon (2005b) argue that in order to accomplish such a feat, government, academics and the food industry must cooperate to implement policies including "agricultural subsidies, pricing policies, regulatory action, and consumer education" (p. 271S). Lobstein (1998), however, notes that "Experts in agricultural and food production on the one hand, and nutrition and public health on the other, rarely meet." (p. 82). Alston, Sumner and Vosti (2006) further explain that "Agricultural policy acts directly on the markets for farm commodities, but only indirectly on the market for food and thus on food consumption choices." (p.314). Lobstein points to a variety of measures undertaken by the EU that encourage consumption of unhealthy diets, including: guaranteed prices and storage for beef and pork; inadequate restrictions on butterfat over-production; governmental support for wheat farmers, 60% of whose crop is grown for animal consumption; hefty export subsidies to the sugar industry, and; "maintaining market stability" for fishing and fruits and vegetables,

resulting in the destruction of thousands of tones of fish, fruits and vegetables. Alston et al. describe the complex link between commodity prices and food prices, revealing that although commodities prices of dairy, meat, and sugar are high and protected by the government, average food prices of dairy, meat and sugar have been declining. The impact of agricultural policies on nutrition and obesity are not yet well understood, and requires further research, according to Alston et al. Lobstein offers foundational question at the start of his insightful article that would be helpful in guiding the discourse on the links between agriculture policies and health: "What is the purpose of food production?" (p. 82).

Smaller scale policy interventions include limiting access to vending machines at schools (French et al., 2001; Fried & Nestle, 2002), approving menus for school meals and stores, adopting healthier choices for fundraising (Raine, 2005), provision of quick and healthy meals and snacks on college campuses (Haberman & Luffey, 1998a), and requiring chain restaurants to provide nutrition information about foods they serve (Nestle & Jacobson, 2000).

Healthy public food policies implemented at schools demonstrate the school leadership's commitment to health, provide guidance and direction for school and food service staff, and ensure accountability for action (French, Story & Fulkerson, 2002; Wechsler et al., 2000). Unfortunately, inconsistency between principals and food service directors regarding responsibility for setting food policy (French et al., 2003) and confusion regarding the meaning of a 'school

food policy' (Lytle & Fulkerson, 2002) may inhibit healthy public food policies from being developed.

2.4.4 Food Advertising and Food Intake

The vast majority of the health literature exploring the impact of food advertising on food intake has focused on children and adolescents (Institute of Medicine, 2005; Lobstein & Dibb, 2005). Indeed, the role of food advertising on adults' food intake has often been relegated to one or two lines in the discussion section of the youth-focused papers. Such comments reflect current wisdom that adults are better able to judge advertisements critically, as well as to understand the intent and nature of advertisements. Adults, the thinking goes, are therefore not in need of protection from food advertising in the same way that children are. This current wisdom is also reflected in public opinion polls, as the American public increasingly recognizes childhood obesity as a significant problem and correspondingly supports the prohibition of advertising and promoting fast foods and less healthy foods to children (Evan, Renaud, Finkelstein, Kamerow & Brown, 2006).

A recent systematic literature review identified the 'Big Five' (pre-sugared breakfast cereals, soft-drinks, confectionary, savory snacks, and fast food) as the most common foods advertised to children (Hastings, Stead, McDermott, Forsyth, MacKintosh, Rayner, et al., 2003). Conversely, the authors found that foods representing a healthful diet receive very little promotional support. Although

Hastings et al. (2003) briefly note means of food advertising other than television, Story and French (2004) more thoroughly examine in-school marketing, product-placements, kids clubs, the internet, toys and products with brand logos, and youth-targeted promotions as marketing channels. Five main conclusions emerged from the Hasting et al. review: first, there is a great deal of food advertising to children; second, the advertised diet is less healthy than the recommended one; third, children enjoy and engage with food promotion; fourth, food promotion affects children's food preferences, purchase behavior and consumption, and; fifth, the effect of food advertising on children is independent of other factors and operates at both a brand and category level.

Many researchers (including Hastings et al.) recognize the somewhat tenuous link between food advertising and food intake among children, which may be mediated through specific factors, such as

> generalized marketing activities (e.g. advertising to parents, promotions to children through the Internet or at the point of sale) or through other non-specific socioeconomic factors (food pricing, food availability, cultural preferences) which influence consumption and lifestyle patterns but which are also reflected in the nature and degree of commercial advertising on children's television (Lobstein & Dibb, 2005, p.207)

Indeed, Lobstein and Dibb (2005) recognize that although food advertising has an effect on children, it would be false to assert that food advertising is the sole cause of obesity or obesogenic behavior. Despite the difficulties in determining the exact amount of responsibility food advertising has in the obesity epidemic,

looking to studies that examine the effect of cigarette advertising on adolescents may be informative. Both cross-sectional and longitudinal studies have clearly shown that exposure and receptiveness to tobacco advertising and promotional strategies is related to adolescent tobacco use (Biener & Siegel, 2000; Altman, Levine, Coeytauz, Slade & Jaffe, 1996; Pierce, Choi, Gilpin, Farkas, & Berry 1998). Given the increasingly aggressive and intensive food marketing strategies that have been employed in the last decade to target children and adolescents (Nestle, 2000c; Story and French 2004), it is reasonable to examine food advertising in any assessment of a food environment.

2.4.5 Nutrition Information

Health-related information has been found to have mixed effects on food liking, with some studies showing a positive effect, others showing a negative effect, and still others showing no effect (Martens et al., 1997; Westcombe & Wardle, 1997; Engell, Bordi, Borja, Lambert & Rolls, 1998). One important moderating factor in the relationship between nutrition information and food liking are people's attitudes towards nutrition or their concern about the health consequences of eating certain foods. Specifically, people who are more concerned or value nutrition more highly appear to be more influenced by nutrition information (Engell et al., 1998).

Also unclear is how nutrition label information is used by consumers (Higginson, Kirk, Rayner & Draper, 2002a). Studies generally show that nutrition information

is used infrequently by consumers (Higginson, Rayner, Draper & Kirk, 2002b). Higginson et al. (2002a) found that much nutrition label use involves simply looking at the information available and moving on without further processing. This surface use of nutrition information occurred even when consumers were seeking "healthy versions" of foods. Of the specific nutrition label information looked at, energy ranked highest, followed by fat (Higginson et al., 2002b).

Although the influence of nutrition information on food choice or even food liking has not been clearly explicated, for the purposes of the current study, the availability of nutrition information in food outlets will be assessed for two reasons. First, in the event that nutrition information is found to exert a broader influence on food choice, it will be helpful to note the presence or absence of such information in an assessment of food environments. Second, noting the availability or absence of nutrition information within a food outlet is a very undemanding task and will not cause undue burden on the researcher.

2.5 Current Illustrations of Determinants of Food Choice

2.5.1 At the Level of the Community

At local levels, the low cost and high convenience of unhealthy foods make it difficult for advocates to improve the food environment. In addition, schools, work-sites, and restaurants often have exclusive "pouring rights" contracts with specific manufacturers such as Pepsi or Coca Cola. Contracts may include written requirements about numbers of vending machines placed in schools or worksites and a required volume of sales (French et al., 2001). Such contracts between

schools and Pepsi Co. or Coca Cola have increased dramatically over the last several years (French et al., 2001).

Vending machine, cafeteria and a la carte revenue has been identified as a pivotal issue to local decision-makers when considering whether to make healthy foods more affordable (French et al., 1997; French et al., 1997; French et al., 2001; French et al., 2002; French & Wechsler, 2004). As French and Wechsler (2004) note, there is a "need for better information on the economics of competitive foods and the role that financial profitability plays in decisions about food availability and sales in the school setting" (p. S106). In several studies where prices of healthier foods in vending machines were decreased, overall revenue did not decline (French et al., 1997; French et al., 2001; Hannan, French, Story, & Fulkerson, 2002; Jeffery et al., 1994). Another study reported that although the sales volume of the target items increased, it was not enough to offset the reduced profit margin and thus resulted in a net revenue loss (French et al., 1997). The authors suggest that smaller price reductions for low-fat items and simultaneous price increases for high-fat items may result in net revenue gains for vendors. In order to 'sell' the idea of lowering the price of healthy foods to decision makers, advocates must offer suggestions for how to avoid revenue losses (Wechsler et al., 2000).

Not only must revenue be considered when advocating for healthy public food policies, but the high convenience of unhealthy foods must also be considered a

potential barrier to improving the food environment. In general, less healthy foods are more convenient for food service providers (Carter & Swinburn, 2004). Providing students and employees with meals of whole grains, fresh vegetables and fruit requires extra preparation and thus may discourage food service providers from advocating for healthy public food policies. In addition, healthy public food policy advocates must recognize that serving healthier foods may represent a hidden cost to school administration in terms of paying increased wages to food service staff to compensate for the extra time to prepare food.

2.5.2 At the Level of Evaluation

The final and perhaps most immediate impediment to improving the food environment are challenges inherent in assessing it. Lytle and Fulkerson (2002) explore four examples to illustrate some of the challenges in attempting to assess the food environment, including (1) a lack of information on the variance of environmental-level outcomes to inform study size calculations; (2) study designs that cannot adequately ensure internal validity for both individual- and environmental-level outcomes; (3) the difficulty in collecting valid and reliable information on the 'food environment'; and (4) increasing and expanding the methods of data collection to include more qualitative methods. Further research is needed to "improve conceptualization and measurement of environmental influences to evaluate their potential effect on food choices" (French et al., 2003, p. 1166).

2.6 Post-Secondary Institutions as a Microcosm of Society

A large Post-Secondary Institution (PSI) may be considered a microcosm of society for the current study for the following reasons. First, large PSIs are comprised of a variety of workplaces (including faculty, academic staff, non-academic support staff, a variety of health care professionals and a variety of part-time student employment), school settings (including undergraduate, graduate, and professional school settings), homes (including shared-room type residences, apartments and other on-campus housing), and businesses (including food and retail outlets on and around campus). Indeed, a large PSI may be viewed as a contained and somewhat captive community. Since students generally comprise the majority of the population at a PSI, the following discussion explores food behaviors among students attending PSIs.

Data suggest that post-secondary students (PSS) have poor dietary habits, including poor nutrient and food group intakes (Brevard & Ricketts, 1996; Georgiou, Betts, Hoerr, Seim, Peters, Stewart, et al., 1997; Haberman & Luffey, 1998a; Huang, Harris, Lee, Nazir, Born & Kaur, 2003), poor dietary behaviors (Anding, Suminski, & Boss, 2001; Buscher, Martin, & Crocker, 2001; Georgiou et al., 1997; Haberman & Luffey, 1998b; Hertzler & Frary, 1989; Racette, Deusinger, Strube, Highstein, & Deusinger, 2005) and weight gain (Racette et al., 2005; Schuette, Song, & Hoerr, 1996). Several studies have reported that PSS failed to meet the minimum number of servings of grains (Anding et al., 2001;

Georgiou et al., 1997; Haberman & Luffey, 1998b), vegetables and fruits (Anding et al., 2001; Buscher et al., 2001; Georgiou et al., 1997; Haberman & Luffey, 1998b; Hertzler & Frary, 1989; Huang et al., 2003; Racette et al., 2005; Schuette et al., 1996), and dairy products (Anding et al., 2001; Haberman & Luffey, 1998b) per day, but tended to consume diets high in fat (Anding et al., 2001; Brevard & Ricketts, 1996; Buscher et al., 2001), sodium and sugar (Anding et al., 2001) and low in fibre (Huang et al., 2003). In addition, PSS tend to snack (Hertzler & Frary, 1989) and consume fast food frequently (Georgiou et al., 1997; Racette et al., 2005), but fail to eat a variety of foods (Anding et al., 2001; Buscher et al., 2001; Fried & Nestle, 2002), maintain a healthy weight (Anding et al., 2001) and eat breakfast regularly (Hertzler & Frary, 1989). Racette et al., (2005) observed that 70% of PSS gained a significant amount of weight during the first two years of college. PSS living on campus have access to many fried and fast foods (Brevard & Ricketts, 1996) and have reported lower levels of variety in their diets (Haberman & Luffey, 1998b).

Several reasons for the poor dietary practices among PSS have been proposed. Cousineau, Goldstein and Franko (2004) note that PSS face a new set of challenges, including developmental, environmental and social transitions, which may lead them to establish poorer eating habits. Alternatively, since evidence suggests that dietary quality declines from childhood to adolescence (Lytle, Seifert, Greenstein, & McGovern, 2000; Morton & Guthrie, 1998), it may be that the poor diet practices among PSS are a continuation of the already worsening

dietary trends.

Meals and snacks consumed during school hours make a major contribution to the day's total energy and nutrient intake (French et al., 2003; Kubik et al., 2003). Of particular concern are the food courts available on most college and university campuses, which offer students a variety of fast and fried foods (Haberman & Luffey, 1998a). Improving the food environment and quality of students' diets is important, therefore, especially if healthy eating is to become a normative behavior (Kubik et al., 2003).

Recently, post-secondary staff have been called upon to become proactively involved in promoting the health of their students (Haberman & Luffey, 1998b; Lowry, Galuska, Fulton, Wechsler, Kann & Collins, 2000), particularly since they have a vested interest in the health of the people they serve (Seymour, Yaroch, Serdula, Blanck, & Khan, 2004). Since PSS represent a somewhat captive population, the potential for food selection manipulation is greater (Seymour et al., 2004). Given that universities represent a place of study, work and living, environmental changes aimed at improving the food environment of the students will automatically improve the food environment of employees and residents as well.

2.7 Conceptual Models of the Food Environment

Few tools to assess the food environment have been proposed in the published

literature (Glanz et al., 2005; Lewis et al., 2005; Swinburn et al., 1999) and grey literature (Michigan Department of Community Health, 2005).

The oldest tool used to determine the obesogenicity of the environment, Analysis Grid for Environments Linked to Obesity, or ANGELO, was proposed by Swinburn, Egger and Raza (1999). The ANGELO consists of a 2 x 4 grid that divides the environment by size (micro and macro) and type (physical, economic, political, and sociocultural). Each element of the grid is characterized as either obesogenic (defined as barriers to the maintenance of healthy weight) or leptogenic (enhancers for the maintenance of healthy weight). A microenvironmental setting is one in which groups of people gather for specific purposes that involve food, physical activity, or both. Conversely, a macroenvironmental sector includes groups of industries, services, or supporting infrastructure that influences the food eaten and/or physical activity undertaken within the various microenvironments. The environment types, in simple terms, include the physical environment (what is available), economic environment (what are the costs), political environment (what are the formal and/or informal "rules"), and sociocultural environment (what are the attitudes and beliefs). One study using the ANGELO framework has been published (Carter & Swinburn, 2004). Strengths of the ANGELO include the authors' heavy reliance on input from local people and health professionals throughout its development and its ecological foundation. For the purposes of the proposed study, however, the ANGELO would need to be modified in order to eliminate measures of the

physical activity environment. A practical weakness of the ANGELO is that, as a conceptual model, it offers no validated or reliable survey questions with which to assess the dietary or physical activity environment. Recently, however, the authors developed a School Food and Physical Activity Survey, sections of which are intended to be completed by a senior administrator, a canteen manager, and a teacher. The School Food and Physical Activity Survey, while applicable to elementary schools, is not applicable in a university setting and thus will not be used to inform the methods of the proposed study.

Glanz et al. (2005) proposed a conceptual model for the study of food environments based on an ecological perspective of health behavior (see Figure 1). The model represents a comprehensive and multi-disciplinary conception of food environments. As a further strength, the structure of the model indicates the integration of the different types of environments and the determinants of those environments. Because of the comprehensive nature of the model, however, extensive resources (i.e. people, time, and funds) are required to adequately assess the food environment. Similar to Swinburn et al.'s model, the current model represents a conceptual framework within which the food environment must be understood. Although tools currently being developed (Personal communication, Karen Glanz, November 6, 2005), at this time, the authors offer little in the way of concrete tools with which to assess the environment. Glanz et al.'s model will be used to inform the methodology of the proposed study.

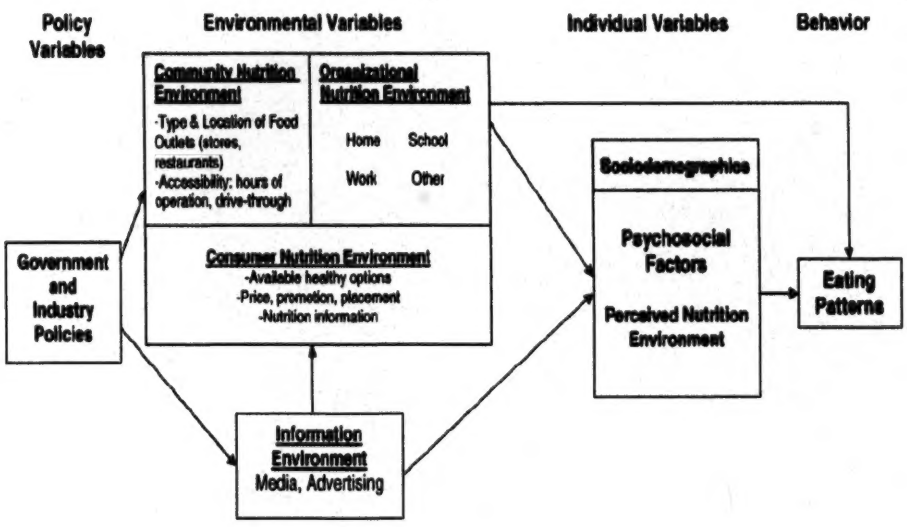

Figure 1: Model of community nutrition environments
Source: Glanz et al., 2005

In the current study, food environment has been defined as the compilation of factors at a variety of levels that affect individual food choice. Nutrition environments, as Glanz et al. have defined them, similarly represent external influences on individual food choice. In the current study, Glanz et al.'s term "nutrition environment" will be used to refer to each specific environment examined in the current study (i.e. community nutrition environment, organizational nutrition environment and consumer nutrition environment) in order to reflect the conceptual model.

Glanz et al. (2005) identify community nutrition environments and consumer nutrition environments as areas of priority for future research. Community nutrition environments include the quantity and type of food outlets, as well as

their location and accessibility. Consumer nutrition environments, on the other hand, include the availability of healthy options, price, promotion, placement and nutrition information. The University of Alberta represents an organizational environment that includes community and consumer nutrition environments. In addition, since the University of Alberta is, for the purposes of the proposed study, conceptualized as a microcosm of society, the policy and information environments are also observable.

2.8 Summary

Given the growing burden of obesity, its co-morbidities and the costs associated with them in Canada, it is important to understand the factors that influence the epidemic. Several of these influences, including food availability, food affordability, food advertising, food-related policies, and the availability of nutrition information, have been discussed at length in the previous sections. Although several conceptual models of the food environment have been proposed, very few tools to assess it have been published. There is a need for such tools to be developed, particularly given their importance in understanding the interaction between the influences and the overall impact of the food environment on food choice. The current study addresses this gap by proposing a series of tools that comprehensively assess the food environment and testing the tools in a real-life setting. The next section will examine the rational for and development of these tools.

3 *Methods*

In order to complete the previously discussed objectives, a descriptive study with mixed methods was chosen to undertake the current study. Though quantitative measures comprise the bulk of the tools, qualitative methods were also deemed to be important in describing the food environment. To test the tools, an appropriate setting (the University of Alberta) was chosen. The assessment tools described in the following sections are organized in the same way that Glanz et al. (2005) organized the diagram of their conceptual model.

3.1 Setting

The University of Alberta is the largest university in Alberta, Canada, with 36,000 students and 9,000 staff and faculty (Beverly Betowski, Public Affairs, University of Alberta, personal communication, September 8, 2006). There were 250,996 full- and part-time post-secondary students in Alberta during the 2003-2004 school year (Clifton Sandford, Advanced Education, Government of Alberta, personal communication, November 4, 2005). Post-secondary students include those attending universities, colleges, technical schools and private university colleges. Therefore, students attending the University of Alberta represent almost 14% of all post-secondary students in Alberta. Nationally, there were 990,400 students enrolled in universities across Canada in the 2003-2004 school year (Statistics Canada, 2005d). Therefore, students attending the University of Alberta represent 3.5% of all Canadian university students. Not only does the University of Alberta represent a relatively large proportion of post-secondary students

province-wide and a significant proportion of university students nation-wide, but the university setting may be looked at as a microcosm of society, given that it includes school settings, workplace settings, residences and businesses.

3.2 Assessment Tools

Both quantitative and qualitative methods of assessing the food environment were developed. Because of the relatively new and developing measures of food environments, qualitative observations were important explorations of new considerations.

3.2.1 Community Nutrition Environment

The location, name, hours of operation and type of every food outlet on campus were recorded. Food outlet types included Asian outlets (including outlets serving Chinese food, Japanese food and Korean food), bars/pubs, burger outlets (including outlets serving mostly burgers and French fries), cafeterias (including large cafeterias and smaller food service outlets), coffee outlets (including establishments whose main products are coffee and snacks), convenience stores, pizza outlets, sandwich outlets (including outlets whose main products are "sub-type" sandwiches, pitas, or regular sandwiches), sit-down restaurants, and smoothies outlets (including outlets whose main product is smoothie-type shakes[2] or fresh juice).

Recently, Lewis et al. (2005) assessed the number of full service and limited service restaurants in different zip-code areas. The authors extracted a list of

[2] Smoothie-type shakes, or "smoothies," refer to a type of beverage that is generally dairy-based and has been blended with fresh fruit to a milkshake-like consistency.

restaurants by zip code from environmental health offices' electronic databases and compared the number of full service restaurants between target areas (i.e. those with a high prevalence of African American residents) and a comparison area (i.e. an area with a low proportion of African American residents). Because the current study took place in a limited area and within one organization, it was unnecessary to use Geographic Information Systems, Environmental Health Office, or City of Edmonton data to determine the number and location of each food outlet. Instead, for the current study, the author entered each building and traversed the publicly accessible floors (i.e. those floors that could be entered without a key during business hours) in order to determine where food is available on the University of Alberta campus. For the purposes of the current study, only publicly accessible floors in buildings on campus were assessed for two reasons. First, Glanz et al.'s (2005) conception of the community nutrition environment applies to food sources available to a broad community (in this case, the University of Alberta community). Assessing each restricted-access floor, departmental lounge and/or lunch room would speak more to the organizational nutrition environment than the community nutrition environment. Second, it was beyond the scope of the current study to establish a contact person within each department and arrange permission to visit each lounge or lunch room.

Although Glanz et al. (2005) recommend observing the availability of a drive-thru as a measure of accessibility, it was unnecessary for the current study since there are no drive-thru restaurants on campus. The recommendation that hours of

operation be recorded as a measure of accessibility, however, was appropriate for the current study and thus was documented.

3.2.2 Organizational Nutrition Environment

As previously mentioned, the organizational nutrition environment refers to other sources of foods that are generally available to a specific population rather than the general public, such as homes and cafeterias in schools and worksites. Assessing the home environment of residents of the University of Alberta was beyond the scope of the current study. For the main undergraduate residence, however, a cafeteria is available to residents. The residence cafeteria was assessed using the consumer nutrition environment assessment methods. As previously discussed, it was beyond the scope of the current study to establish a contact person within each department and arrange permission to visit each lounge or lunch room.

In addition to the specific conception of the organizational nutrition environment by Glanz et al. (2005), organizational documents or surveys that are related to food were also qualitatively assessed (as described in section 3.2.3). Since the University of Alberta is a special case in that it is a large organization containing many sub-organizations, a relevant university-wide document, survey or plan would reasonably be expected to influence food environment of the sub-organizations within the university.

3.2.3 University of Alberta Policies

Food-related policies may include exclusivity agreements, types of restaurants allowed in the various campus buildings, food safety policies and food service provider policies. The University of Alberta website was examined to reveal any food-related policies and the aspects of the environment addressed by said policies. Specifically, the University of Alberta Policies and Procedures Online (UAPPOL) website was consulted to find policies. Since all University of Alberta policies are outlined on the UAPPOL website it was considered sufficient to use this web resource to indicate all food related policies. Search strings included combinations of: food, nutrition, vendors and health. In addition, the UAPPOL "A to Z index" was searched in order to ascertain whether any food-related policies were missed by the keyword search.

The appropriate authorities within the food service organization, the Students' Union and university administration were contacted and asked for additional information regarding food related policies. A semi-structured interview guide (Roth, 2000) was developed in order to ascertain whether there were other food-related policies available. Interview questions explored the decision-making process of the organization, the existence of policies to influence food availability or food sales, and requested a copy of any existing polices. Where appropriate, probes (Roth, 2000) were used to elicit more detail. The interview guide is appended in Appendix A.

3.2.4 Information Environment

Because the setting of the current study is the University of Alberta, the information environment was defined as any food-related media or advertising on campus that is not in or on the actual outlet (i.e. the name sign on the food outlet will not be included as part of the information environment). Advertising on campus (including advertisements and promotions on the campus radio station, in the campus newspaper, and in other campus publications) were assessed for location, type (including radio, print, bill board, etc.), size (for print ads), quantity, subject matter, and details of promotion. Table 2 is an example of the instrument used to organize data collection of the information environment.

Table 2. Data collection table for information environment

Source	Size	Primary Subject Matter	Secondary Subject Matter

Sources of advertisements assessed included the campus newspaper, the campus radio station and undergraduate and graduate handbooks produced by the University of Alberta. Other publications that may also be targeted in part to the campus community (e.g. the newspapers *Edmonton Journal*, *See* and *Vue*, and other radio stations) were excluded from data collection in order to make data collection manageable for one researcher. The size (specifically, the area in cm^2) was recorded for print materials. Primary subject matter was recorded and coded under the following headings: bar/pub; campus food bank; pizza outlet; sit-down restaurant; coffee outlet; sandwich outlet; smoothies outlet, and; non-alcoholic beverage. Secondary subject matter from bar/pub advertisements was also

recorded and coded under the following headings: alcohol; events; food; miscellaneous.

Campus-specific publications were retroactively obtained such that the first publications assessed were all published between the beginning of January 2005 and the beginning of January 2006. Both the undergraduate and graduate handbooks from the 2005/2006 academic year were also assessed. The relevant authority at the campus radio station was approached and provided a list of food-related advertising from January 2005 to January 2006.

Food-related articles within the student newspaper were qualitatively analyzed using content analysis. According to Krippendorff (2005), content analysis must include the following considerations: the choice of data to be analyzed; the definition of the data to be analyzed; the population from whence the data are drawn; the context relative to which the data are analyzed; the boundaries of the analysis, and; the target of the inferences. Themes within articles were coded in an emergent, rather than a priori manner (Roth, 2000).

3.2.5 Consumer Nutrition Environment

Recently, Lewis et al. (2005) designed an instrument to measure the availability, quality, and preparation of food on the basis of a restaurant's menu to provide the least biased data. The survey instrument includes 62 questions that cover a variety of topics. The survey assesses the information provided to the customer in the

restaurant, types of food offered and methods of preparation, beverage options, meal prices, and store characteristics (including parking access, proximity to public transit, cleanliness, and security). Lewis et al.'s survey offers one concrete example of how to assess consumer nutrition environments. Questions from the survey have been examined to ensure that data from the current study are comparable to those reported by Lewis et al. (2005). Because Lewis et al. (2005) only examined restaurants, however, the survey is not, in its entirety, applicable to the proposed setting and thus was adapted to suit the purposes of the current study. Specifically, questions that applied to the current study were kept and the others were discarded.

The consumer nutrition environments of convenience stores were not assessed for three reasons. First, upon entering all ten convenience stores on campus, it became apparent that the vast majority of food items for sale belonged to the "Not Recommended" category (refer to section 3.2.5.1 for a discussion of food categories). Second, the vast majority of the convenience stores did not sell "Main Meal" food items. Third, the number of types of "Snacks and Sides," numbered in the hundreds in most cases (given the number of different types of chocolate bars, hard and gummy candy, chips and salty snacks, this number is not surprising) and thus a complete assessment could not be undertaken in a reasonable time without annoying staff or disturbing customers. For these three reasons, the consumer nutrition environments of convenience stores were not assessed. In addition, it is reasonable to assume that convenience stores represent a "less healthy" type of

food outlet at which to buy food. Data from the convenience stores, therefore, do not contribute to the consumer nutrition environment results. Instead, they are only included in the community nutrition environment results.

3.2.5.1 Food Availability

The name and type of each food outlet were recorded. The number of healthy and unhealthy options of main meals, snacks, and beverages were assessed for each food outlet. Given that there is no agreed-upon definition of "healthy food" in the literature, for the purposes of this study, the 2005 British Columbia Ministries of Education and Health food categories of "Not Recommended," "Choose Least," "Choose Sometimes" and "Choose Most" were adopted (Ministry of Education & Ministry of Health, 2005). Foods that are categorized as "Choose Most" are foods that are consistent with Canada's Food Guide to Healthy Eating, and WHO recommendations (WHO, 2003). Specifically, "Choose Most" foods, "including whole grain breads and fresh vegetables, tend to be the highest in nutrients, the lowest in unhealthy components, and the least processed" (Ministry of Education & Ministry of Health, 2005, p. 2). "Choose Sometimes" foods, "including such things as fruit canned in light syrup, represent choices that are moderately salted, sweetened, or processed" (p. 2). "Choose Least" foods, "including such things as fries, tend to be low in key nutrients such as iron and calcium and highly salted, sweetened, or processed" (p. 2). "Not Recommended" foods, "including candies and drinks where sugar is the first ingredient, or the second ingredient after water, tend to be highly processed, or have very high amounts of sweeteners, salt, fat,

trans fat or calories relative to their nutritional value" (p. 2). Healthy foods and beverages were considered those foods that fall into the "Choose Most" or "Choose Sometimes" categories. The BC Ministries of Education and Health represent the only provincial, Canadian definition of healthy food and thus were adopted to define the health-related categories of food. The Quick Reference (see Appendix B), developed in conjunction with the guidelines for food and beverage sales (see Appendix C), provides a brief overview of how foods are categorized.

In addition to the number of healthy and unhealthy food and beverage choices available, wait times at each establishment, the number of "Supersize" (i.e. advertised options that promise extra value for the dollar, such as "up-sizing" a combo, "sumo-sizing" a dish or "all you can eat" options) and "Kiddie-size" options (i.e. smaller-sized portions of a given menu item for a lower price), healthier preparation options, and whether the healthier preparation option incurred an added cost were recorded. Wait times were measured by calculating the difference between the time one customer entered a lineup during lunch hour (i.e. between noon and 1:00 p.m.) and the time the same customer paid and was handed his or her food. Healthier preparations options were considered any alternative method of preparing the same food that would result in the food having a higher nutritional value or being lower in salt, fat, cholesterol, or sugar. For example, baked or broiled chicken instead of fried chicken, baked or boiled potato instead of fried potato and whole wheat bread instead of white bread on a sandwich are all methods of preparing the same basic food differently to alter its

nutritional content. Table 3 represents the worksheet used to collect food availability data.

Table 3: Data collection table for food availability

Name of food outlet	Type of food outlet	Main meal		Snacks		Beverages	
		Healthy options (#)	Unhealthy options (#)	Healthy options (#)	Unhealthy options (#)	Healthy options (#)	Unhealthy options (#)

Table 3 cont'd: Data collection table for food availability

Name of food outlet	Wait Times (minutes)	Super-size option available	Kiddie-size option available	Availability of healthier preparation options	
		(Y/N)	(Y/N)	Type	Added cost (Y/N) (Cost)

3.2.5.2 Food Affordability

Foods were selected such that each food chosen represented a "typical" food choice from a given outlet. For example, at a burger outlet with one or two salads on the menu, a burger and fries were selected instead of a salad to represent the food or foods chosen most often from the outlet. The selected foods, as well as the number of foods chosen at a given establishment thus represented the subjective judgment of the primary researcher. In making the food choices, careful attention was paid to the range and variety of foods served at each establishment. Hence, more foods were chosen from certain food outlets (i.e. those with a greater

variety) than others (i.e. those whose menus were less varied). Prices of selected foods were recorded and compiled in a spreadsheet. Foods were purchased then weighed using a Mettler Toledo PB3002-Sv scale and their weight in grams was recorded. Using the nutrition information provided by the food outlet (either in a nutrition information brochure or on the internet) or the ESHA food processor (version 7.8) nutrient analysis software and the food weight (g), the average energy density (kilocalories per gram) for a given item was determined. Average cost (in Canadian dollars) of a given food item was determined and from these two datasets, the energy cost ($Cdn/100kcal) was determined (Drewnowski, Darmon & Briend, 2004). Lewis et al. (2005) assessed food affordability by collecting data on the least expensive and most expensive breakfast, lunch, and dinner items in each restaurant. This method, although relatively easy to use, does not provide an adequate level of detail with respect to food affordability and thus has not been adopted for the current study. Table 4 provides an illustration of the food affordability data collection table.

Table 4: Data collection table for food affordability

Food Outlet Type	Food	Cost ($)	Weight (g)	Energy (kcal)	Energy Density (kcal/g)	Energy cost (CAD/100kcal)

3.2.5.3 Food Promotion within Food Outlets

The number, size, and subject[3] of promotions within each food outlet were also assessed. See Table 5 for an organized data collection tool. The sizes of the

[3] Since advertisements were within the food outlets, it is reasonable to assume that the advertisements were not be explicitly advertising the outlet itself, but rather specific foods within the outlet. Thus, in this case, "subject" refers to the type of food advertised.

advertisements were divided into small, medium, and large. Small advertisements included counter-top displays or posters up to 8.5" x 11", the size of a standard sheet of paper. Medium advertisements were those larger than 8.5" x 11" but smaller than 18" x 24". Large advertisements were those 18" x 24" or larger. The reason such seemingly arbitrary sizes were chosen to define small, medium and large advertisements was because of the author's familiarity with each size. For example, standard sheets of paper (8.5" x 11") are used daily by the author and thus represent a familiar size. Similarly, the author's office bulletin board, which she views daily, is approximately 18" x 24" and thus is also a recognizable size. For this reason, it was unnecessary for the author to bring a tape-measure to each outlet to measure each advertisement. Instead, each advertisement was "eye-balled" and compared to the pre-set notion of each size. Subjects of each advertisement were coded into one of the following categories: unhealthy, healthy and overeating. Each advertisement was coded in up to two categories. For example, a burger outlet that advertised its "Super-size" option for its burger, fries, and soft drink combination was coded both as unhealthy and as overeating. Advertisements included in the unhealthy category were those whose main subject was an unhealthy item according to the previous definition of unhealthy foods. Similarly, advertisements considered healthy were those advertising healthy foods according to the previous definition. Advertisements included in the overeating category were those advertising "Super-size", "Jumbo", "Sumo" or "All you can eat" options.

Table 5: Data collection table for advertisements

Name of food outlet	Type of food outlet	Size of advertisement	Subject of advertisement

3.2.5.4 Nutrition Information

The availability of nutrition information from each food outlet was also recorded. Lewis et al.'s (2005) survey incorporated several of the topics included in Table 6. Additionally interesting, for the purposes of the current study, was whether nutrition information was available in the food establishment, in take-home pamphlets, on-line, or not at all.

Table 6: Data collection table for nutrition information

Name of Food outlet	Type of food outlet	Number of items with health labels	Label description[1]	Location of nutrition information[2]	Vegetarian main meals available

[1] Label description: Content (i.e. related to the food's contents, such as fibre, fat, energy, etc), vegetarian, "healthy" or "nutritious", and organic or fair trade.
[2] Location of nutrition information: Online, pamphlet, in-store, N/A

3.3 Data Analysis

SPSS® for Windows® was used for analysis of all quantitative data as described below. For each inferential statistical test, a p value of ≤ 0.05 was used to determine significance.

3.3.1 Community Nutrition Environment

Food outlets were coded into one of the following categories: Asian outlet; burger

outlet; cafeteria; coffee outlet; pizza outlet; sandwich outlet; sit-down restaurant, and; smoothies outlet. The number of outlets in each category was tallied and the mean number and range of weekday and weekend hours of operation were calculated. To establish whether the hours of operation of outlet types differed significantly, linear regressions were performed between weekday or weekend hours of operation and the categorical independent variables (in this case, outlet type).

3.3.2 Organizational Nutrition Environment

Food-related organizational-specific documents and surveys were described and implications for the organizational nutrition environment were noted. In order to obtain access to said organizational-specific documents, interview participants from the Students' Union, University of Alberta administration, and Aramark Canada Ltd (see section 3.3.3) were asked for any information on overarching themes among their constituents or peers related to food. For example, a question directed to the Students' Union representative was, "How do the students feel about campus food?"

University of Alberta cafeteria data were analyzed in the same manner as the consumer nutrition environment. Thus, results from cafeteria data may be found under consumer nutrition environment results.

3.3.3 University of Alberta Policies

Content analysis was conducted on University of Alberta food-related policies. In

keeping with Krippendorff's (2005) previously discussed considerations, University of Alberta food-related policies were considered data to be analyzed. Policies, as previously noted, were defined as broad University policies (proclaimed by university administration, the food services organization, or the Students' Union) that affect any retail food outlet, food preparation method, or food-safety issue on University property. Food-related policies were drawn from all University of Alberta policies. Food-related policies were first described and then categorized to reflect the nature of the policy maker(s), the formality of the policy (i.e. whether the policy is formal or informal) and the aspect of the food environment addressed by said policy. Representatives from the Students' Union, the University of Alberta administration and Aramark Canada Ltd. were approached and asked to take part in an interview in order to obtain full disclosure of food-related policies that may not appear on the University of Alberta website. Interview participants were contacted in a follow-up call in order to increase the trustworthiness of the data by conducting member-checking. Participants were asked about their answers to the semi-structured questions to ensure that the researcher understood the meaning and could clarify any ambiguous statements.

3.3.4 Information Environment

Print advertisement data from the information environment were first qualitatively coded into one of the following eight categories: bar or night-club; campus food bank; pizza outlet/pizza; sit-down restaurant; coffee outlets; sandwich outlets; smoothies outlet; non-alcoholic beverages. Bar and night-club advertisements

were further coded into the following four secondary subject matter themes: alcohol; events; food; miscellaneous. Descriptive statistics included the number, the mean area (cm^2) and size range (cm^2) of advertisements in each code. Regression analysis was conducted between the mean area (cm^2) of print advertisements and their primary and secondary themes (categorical independent variables).

3.3.5 Consumer Nutrition Environment

3.3.5.2 Food Availability

Descriptive and inferential statistics were used to analyze food availability. Descriptive statistics included means and ranges of food availability data where appropriate. Inferential statistics included regression analyses with categorical independent variables. Specifically, the mean proportions of healthy main meals, snacks and beverages were regressed by the type of food outlet. Wait times and the availability of specific foods were also regressed by the type of outlet.

3.3.5.2 Food Affordability

The energy cost ($Cdn/100 kcal) and energy density (kcal/g) of all foods were calculated. Foods were categorized according to the type of outlet from which they were purchased and according to the type of food. The mean energy cost ($Cdn /100 kcal) and mean energy density (kcal/g) of typical foods were calculated both by type of outlet and type of food. Subsequent regression analyses with categorical independent variables (food outlet type and food type) were used

to assess differences in mean energy cost and mean energy density by type of food outlet and type of food.

3.3.5.3 Food Promotion within Food Outlets

The number of advertisements and the corresponding proportion of healthy, unhealthy and overeating advertisements were calculated for each food outlet type and advertisement size. The proportions of the subject matter codes were regressed by size and the type of outlet (both categorical independent variables) to determine, for example, whether a specific type of food establishment advertises healthy foods more often than another or whether a certain size of advertisement is more likely to advertise unhealthy foods than another.

3.3.5.4 Nutrition Information

The number of food outlets with any menu items labeled was calculated along with the range of items labeled in each type of outlet. The proportion of outlets with menu labels was regressed by the type of outlet. In addition, several other regressions were conducted, each with the same categorical independent variable (type of outlet). These were the mean proportion of items labeled, the proportion of each type of label description (i.e. content labels, vegetarian meal labels, "healthy" or "nutritious" labels and organic or fair trade labels) and the proportion of outlets with available nutrition information.

3.4 Summary

Using the University of Alberta as a setting for the test case of these tools is an

appropriate decision because of the nature and types of environments within the University. Indeed, it may be considered a microcosm of society due to the varied environments (i.e. governing bodies, work places, school settings, homes, businesses) and the interactions between the environments. In addition, the number of people affected by the food environment, approximately 45,000, is not insignificant. The development of the assessment tools that have been discussed were based on the conceptual model proposed by Glanz et al. (2005) and were heavily informed by the literature on population-level influences on food choice. The following section describes the findings of the tools' implementation.

4 *Results and Discussion*

The following sections describe the findings from the previously described assessment tools' implementation. A discussion of the significance of the findings and how each finding fits within the context of the broader literature directly follows each section of results. The results and summary sections are organized according to the types of environments explained within the conceptual model proposed by Glanz et al. (2005).

4.1 Community Nutrition Environment

There are 85 food outlets on campus, including eight Asian outlets, five burger outlets, 13 cafeterias, 13 coffee outlets, ten convenience stores, eight pizza outlets, 16 sandwich outlets, six sit-down restaurants and five smoothies outlets. Three main buildings, the Students' Union Building (SUB), HUB mall (a mall and residence owned by the University of Alberta that contains mostly individually-owned food outlets), and the Central Academic Building (CAB) (which houses a large Aramark-owned and operated food court) contain 43 food outlets all together. SUB contains 11 food outlets, HUB mall contains 22 and CAB contains nine. The other 43 food outlets are more evenly distributed around the University of Alberta campus.

Table 7: Number and proportion of food outlets on campus

Type of Outlet	Number	Proportion of total (%)
Asian outlet	8	10
Burger outlet	5	6
Cafeteria	13	15
Coffee outlet	13	15
Convenience store	10	12
Pizza outlet	8	10
Sandwich outlet	16	19
Sit-down restaurants	6	7
Smoothies outlet	5	6

There are 245 Coca-Cola brand vending machines on campus (including Coke, Dasani, Minute Maid, Fruitopia, Powerade and Full Throttle). There are 93 Edmonton Coin Vending machines on campus (including snacks, pre-packaged food, milk, hot beverages and ice cream). In total, there are 338 vending machines on the University of Alberta campus. On average, there are approximately seven vending machines per square block.

4.1.1 Weekday hours of operation by type of location:

Table 8 describes the weekday and weekend hours of operation by type of food outlet.

Table 8: Weekday and weekend hours of operation by outlet type.

Type of outlet	Number	Mean number of weekday hours	Range	Mean number of weekend hours	Range
Asian outlet	8	53	33-75	11	0-24
Burger outlet	5	65[a]	53-86	17[a]	0-35
Cafeteria	15	39	18-64	3	0-23
Coffee outlet	13	67[a]	38-120	17[a]	0-48
Convenience store	10	66[a]	40-120	18[a]	3-48
Pizza outlet	8	55[a]	25-75	11	0-28
Sandwich outlet	16	55[a]	20-80	10	0-29
Sit-down restaurant	16	65[a]	55-81	14	0-24
Smoothies outlet	5	34	30-70	7	0-19

[a] Indicates statistically significantly longer mean number of hours of operation than cafeterias using regression analysis with categorical independent variables

Cafeterias were open for a significantly shorter duration during the week than burger outlets ($p=0.005$), coffee outlets ($p=0.000$), convenience stores ($p=0.000$), pizza outlets ($p=0.045$), sandwich outlets ($p=0.013$) and sit-down restaurants ($p=0.003$).

On campus, food is available for purchase 24 hours a day, 7 days a week. It is reasonable to assume that most University staff have a more regular work schedule (i.e. that they are generally on campus during business hours), and that students (particularly those who live on campus) may be on campus during later hours, given the nature of the two vocations. Given this assumption, weekday hours of operation were divided into two categories: up to 50 hours/week, or 10 hours/day, on average, and; more than 50 hours/week, or more than 10 hours/day on average. In this way, the proportion of food outlets that cater more to staff (i.e. open up to 50 hours/week) and those that cater more to students (i.e. those that are

open more than 50 hours/week) was estimated. Table 9 describes the two categories and the corresponding types of food outlets.

Table 9: Categories of hours of operation by outlet type

Type of outlet	Number of outlets open up to 50h/wk	Proportion of outlets open up to 50h/wk (%)	Number of outlets open >50h/wk	Proportion of outlets open >50h/wk (%)
Asian outlet	3	38	5	62
Burger outlet	0	0	5	100
Cafeteria	12	92	1	8
Coffee outlet	2	15	11	85
Convenience store	0	0	10	100
Pizza outlet	2	25	6	75
Sandwich outlet	6	38	10	62
Sit-down restaurant	0	0	6	100
Smoothies	2	40	3	60

Based on this proxy index, cafeterias seem to cater more to staff while burger outlets, convenience stores and sit-down restaurants seem to cater more directly to students.

4.1.2 Weekend hours of operation by type of location:

Table 8 (p. 52) describes the weekday and weekend hours of operation by type of food outlet. Cafeterias were open for a significantly shorter duration during the weekend than burger outlets ($p=0.020$), coffee outlets ($p=0.003$), and convenience stores ($p=0.003$).

4.1.3 Community Nutrition Environment: Summary and Interpretation

Section 4.6.1 describes how the community nutrition environment results relate to

the overall convenience of the food environment at the University of Alberta.

The assumptions that informed the proxy index of whether an outlet targeted students or staff are unverifiable, and thus may lack practical significance. For example, although 12 of 13 cafeterias on campus were open 50h/wk or less, they target students (particularly the cafeterias within the students' residences) more than staff. All burger outlets, convenience stores, and sit-down restaurants were open more than 50h/wk. These results indicate that these three types of outlets target students more than staff. It is also possible, however, that sit-down restaurants, in particular, cater to the outside community in addition to students and staff. Given the limitations of this proxy index, of course, the results should be interpreted cautiously; however, given the potentially negative health consequences of choosing food from convenience stores (see section 3.2.5) and burger outlets (see section 4.6.6), it may be of note that these types of outlets seem to target students more than staff. A more in-depth analysis of the intended target audience of different types of outlets was beyond the scope of the study and was thus not undertaken.

4.2 Organizational Nutrition Environment

Both the interview participants from the Students' Union and the University of Alberta administration pointed to two documents that, in their opinion, may influence the food environment of the campus and sub-organizations within the university. The interview participant from Aramark Canada Ltd. was unaware of

both documents, perhaps in part due to her relative geographical and vocational separation from the university campus. The documents referred to by the Students' Union and administrative representative were the Students' Union General Survey and the Senate Task Force on Wellness Report. Results from the Students' Union General Survey in 2004 came out in 2005 and contained two quantitative questions regarding students' perceptions of food on campus as well as a qualitative section in which students were able to voice concerns about any campus-related issue. Second, the University of Alberta's Board of Governors invited a Task Force on Wellness to produce a report. The report, which came out in 2003 and is entitled, "Becoming the Healthiest University in Canada", provided the Board of Governors with recommendations on how to improve the health of the University of Alberta community. The report included two food-related recommendations. Both the Students' Union General Survey results and the Task Force on Wellness report will be explored in greater detail below.

4.2.1 Students' Union General Survey

The Students' Union at the University of Alberta conducted its last General Survey in 2004. The Students' Union surveyed a representative sample of 2,484 undergraduate students. Survey questions included "Do you think that food is reasonably priced for quality in SUB [Students' Union Building]? CAB [Central Academic Building]? Lister [Undergraduate residence]? Campus Bars?", "Do you think there are enough healthy food options in SUB? CAB? Lister? Campus Bars?" and also included a qualitative component where students were invited to

"make any additional comments you have about any topic." The results to the questions are indicated in Tables 10 and 11.

As seen in Table 10, the highest proportion of students (approximately 33%) responded that Campus Bars provided reasonably-priced food, followed by SUB (around 19%) and CAB (around 13%). Lister Hall, a student residence with a mandatory meal plan, ranked lowest, with only 5% of students indicating their perception of reasonably priced food and approximately 74% disagreeing.

Table 10: Students' perceptions of reasonable food pricing on campus

	Yes (%)	Somewhat (%)	No (%)	Unsure (%)
SUB[1]	19	49	32	0
CAB[2]	13	43	44	0
Lister Centre[3]	5	18	74	3
Campus Bars[4]	33	41	26	0

[1] Students' Union Building: houses a large food court, three food outlets of which are owned and operated by the Students' Union
[2] Central Academic Building: houses a large food court owned by Aramark
[3] Lister Centre: the largest undergraduate campus residence
[4] Campus Bars: two campus bars, both owned and operated by the Students' Union

Students were also asked whether or not they felt that they had enough healthy food options available to them on campus. As evidenced by results in Table 11, there were a high number of "no" results for every location listed (with the highest "no" rating, 63%, for Lister Hall). The highest proportion of "yes" ratings (about 32% of respondents) went to SUB, followed by CAB (24% of respondents) and the Campus Bars (18% of respondents). Lister ranked lowest in terms of total "yes" ratings (12% of respondents). Given that the primary source of food for

students living in Lister Centre is the cafeteria therein, it is of note that 63% of respondents answered "no" to the question, "Do you think there are enough healthy food options in Lister?"

Table 11: Students' perceptions of the availability of healthy food on campus

	Yes (%)	Somewhat (%)	No (%)	Unsure (%)
SUB	32	35	32	1
CAB	24	36	40	0
Lister Centre	12	25	63	0
Campus Bars	18	34	48	0

Of the 627 qualitative responses received, the second largest category of responses (n=94) represented comments about University food. Of the 94 food-related responses, 93 were negative and related to the perceived poor quality and high price of foods in SUB and CAB (n=29), the lack of variety across campus (n=23), the perceived poor quality and high price of foods in Lister (n=20), high alcoholic drink prices in Campus Bars (n=13) and the perceived poor quality and high price of foods in the Campus Bars (n=9). Of the 93 negative comments, responses ranged from mildly negative (e.g. "More fresh fruit should be available for purchase in HUB and SUB.") to vehemently negative (e.g. "I HATE LISTER FOOD. EAT S--- ARAMARK! "L" LEVEL FOOD [i.e. the class of food served in Lister Centre] IS LESS THAN A PRISON'S "B" LEVEL." [i.e. the class of food served in prisons that use Aramark services]). The negativity expressed in the vast majority of qualitative responses support the results of the two quantitative questions and further illustrates the dissatisfaction among students with respect to food on campus.

In an interview with the Vice President of the Students' Union in charge of Student Life (see section 4.3.1), it quickly became apparent that the executive members of the Students' Union were aware of and concerned by the overwhelming food-related concerns presented by students. Despite this, however, the Students' Union was not, at the time of data collection, making a concerted effort to address these concerns. Instead, the Vice President reported the need to focus on the Students' Union as a business (i.e. if demand for healthy food increases, he reasoned, then Students' Union businesses and other food outlets on campus would supply that demand) and the importance of giving the students choices (i.e. he cited examples such as rotten salad and raw vegetables at closing time in both Students' Union-run restaurants as evidence that students wanted less healthy options such as hamburgers and French fries instead of healthy options like salad and vegetable plates. Although he noted that paying an additional $1.50 to $2.00 for salad instead of French fries in the Students' Union-owned campus bars may have an impact on students' food choice, he quickly returned to the supply and demand argument). Despite the overwhelming response of dissatisfaction with food on campus, the Students' Union was not considering actions that would improve the organizational nutrition environment.

4.2.2 Senate Task Force on Wellness, 2003

The University of Alberta Senate struck a Task Force on Wellness in 2002 in order to explore the status of health and wellness initiatives at the University of Alberta. The Task Force's final report was released in July 2003. According to the

University Senate webpage, on 26 September 2003 the University's Board of Governors unanimously passed the following motion:

> That the Board of Governors approve in principle, as strongly recommended by the Board Safety, Health and Environment Committee, the recommendations of the Final Report of the Senate Task Force on Wellness (2003) and that the Board of Governors ask the Administration to review the recommendations, prepare an official response to the report to be presented to the Board of Governors at its January 16, 2004 meeting, and report progress back to the Board of Governors at subsequent Board meetings. (Senate web page).

The Task Force made 23 specific recommendations in its report, including two pertinent to the current study. These include "[increasing] the number, variety and allocation of healthy food choices across campus" (Senate Task Force on Wellness, 2003, p. 3) and "[providing] incentives to food service operators for the provision of healthy food choices" (Senate Task Force on Wellness, 2003, p. 3). Although the University's Board of Governors unanimously approved the recommendations and struck a committee to begin to implement the recommendations (the Workplace Health Promotion Advisory Committee), neither of the food-related recommendations have been implemented systematically. Neither formal nor informal food-related policies have emerged from the final report.

4.2.3 Organizational Nutrition Environment: Summary and Interpretation

Both the Students' Union General Survey and the Senate Task Force report indicated dissatisfaction with the currently available food choices on campus. Though the Senate Task Force on Wellness Report (2003) was addressed to the

Board of Governors at the University of Alberta and the Students' Union General Survey was addressed to the Students' Union, both documents described the need to increase the number of healthy food choices. These two documents, taken together, represent two main prerequisites of change. Specifically, as seen with the university's response to the Senate Task Force on Wellness Report, the upper echelons of the University of Alberta's decision makers indicated their agreement with improving the health of the food environment (a top-down approach). The Students' Union general survey indicates a common sentiment of dissatisfaction among students with respect to both the number and the cost of healthy food options available (a bottom-up approach). Unfortunately, the positive reception and approval of the Report by the Board of Governors and the awareness of student dissatisfaction among members of the Students' Union executive have not translated into action on behalf of the two governing bodies to see that the number of healthy food options is increased. One possible (and oft-cited: see section 4.3.5) reason for this is that the Board of Governors and the Students' Union have little power to effect change immediately because the university has a contract with Aramark that will not be up for renewal until 2010. Similarly, any food-related policy enacted by the governing bodies will not affect the food court tenants in the various university buildings until their individual contracts come up for renewal.

4.3 Food-Related Policies

A thorough search of the UAPPOL website turned up no food-related policies,

because all formal policies influencing the University of Alberta's food environment were, in fact, exclusivity contracts (see Table 12). An overview of food-related policies at the University of Alberta is presented in Table 12. Descriptions and outlines of the policies follow.

Table 12: Summary of policies addressing the food environment

Governing Body	Formality	Policy	Aspect of food environment affected
Students' Union	Formal	Ethical Business Partners	Food availability
Students' Union	Formal	Table Booking and Displays	Food availability
Students' Union	Informal	Guaranteed market niches	Food availability and affordability
Aramark	Formal	Mandatory Meal Plan	Food availability and affordability
Aramark	Formal	Partnerships with fast food franchises	Food availability and affordability
University of Alberta	Informal	Guaranteed market niches	Food availability and affordability
University of Alberta and Edmonton Coin Vending	Formal	Exclusive vending rights contract	Food availability and affordability
Students' Union, Aramark and the University of Alberta	Formal	UDINE cards	Food availability and affordability
Students' Union, University of Alberta and Coca-Cola Bottling Ltd.	Formal	Exclusive pouring rights contract	Food availability and food affordability

4.3.1 Students' Union

A qualitative interview was conducted with the Vice President of the Students' Union in charge of Student Life (hereafter VPSL). According to the VPSL, the

Students' Union at the University of Alberta has two formal policies that may affect food availability: the Ethical Business Partners policy and the Table Bookings and Displays policy.

The Ethical Business Partners operating policy was implemented in April 2003. The policy states that the Students' Union will give preference to "Canadian-based, energy efficient companies" that "use minimal packaging, use recycled or reused materials where possible, produce organic products and/or possess a fair trade label" (p. 1). In addition, the policy asserts that "the Students' Union will not knowingly conduct business with companies that fail to meet basic standards of environmental protection, fail to respect basic human rights, or inflict excessive or unnecessary suffering on animals" (p. 1). This policy has resulted in the Students' Union decision to sell only fair trade coffee at the three establishments it directly owns and operates in the Students' Union Building food court..

Policy 11.16, the Table Bookings and Displays policy, also may affect food availability. The policy states:

> The Vice President (Operations and Finance) shall refuse applicants where, and only where: a) the individual or group submitting the request plans on engaging in commercial activities that would directly conflict with those commercial activities engaged in by one or more of the Students' Union's tenants unless said competition consists of food items in a relatively small quantity or portion and provided that no exclusivity agreements would be breached by the presence of said food items... (p.1)

The Students' Union owns one building on campus, the Students' Union Building (hereafter SUB). The Students' Union has tenant lease agreements with the food court tenants, which give each tenant a guaranteed market niche upon which no other tenant may infringe. This informal guaranteed niche market policy affects both food availability and food affordability in that only one outlet may carry a specific type of food. Therefore, vendors need not compete with one another in terms of food quality or food pricing since they corner the market on their particular food item. Table 13 describes the guaranteed market niches of SUB tenants.

Table 13: SUB tenants and corresponding market niches

Tenant	**Market Niche**
Java Jive	All specialty and/or gourmet teas and coffees
Funky Pickle	Pizza
Edo Japan	Oriental style food
Marco's Famous	Burgers, donairs and fries
Subway	SUB style sandwiches
Students' Union establishments (3)	Donuts, hot food and smoothie style drinks

4.3.2 Aramark

The University of Alberta has been under contract with Aramark Canada Ltd (hereafter Aramark) since 1994. The contract, which was renegotiated in 2005, will be up for renewal again 2010. Aramark is a professional services corporation whose services include providing food services to a variety of institutions, including university and college campuses, prisons, hospitals, senior living facilities and elementary and secondary schools. Currently, Aramark is responsible for 21 food outlets on campus (including its corporate partnerships,

lunch rooms and cafeterias).

A qualitative interview was conducted with the Aramark Marketing Program Manager of Campus Marketing for Western Canada (hereafter Marketing Program Manager). According to the Marketing Program Manager, Aramark does not have food-related policies that are available to the general public. Instead, Aramark provides "a variety of entrees based on what the students ask for; foods that students like and new items to see if the students like it (sic)." The Marketing Program Manager pointed out that Aramark eateries on campus offer milk, yogurt, juices, fresh fruit, salads, and sandwiches, and noted that, in addition to vegetarian, vegan, and protein options, "if a student wants it, we see what we can do." The Marketing Program Manager discussed the mandatory meal plan for students living in the largest undergraduate residence, which ranges from $1800 to $3800 for eight months (see Table 14). Residents of Lister Centre must purchase a meal card with a declining balance and may use the meal card to purchase food at all Aramark locations on campus and at nine locations in SUB. Aramark also administers a UDINE card that may be purchased by any member of the University of Alberta community (i.e. staff or student) and may be used at all Aramark locations and at the same nine locations in SUB. Neither the meal plan cards nor the UDINE cards are accepted by vending machines.

Table 14: Residence meal plan options as described by University of Alberta residence services[1]

Cost	Best suited for
3,800	students with a good appetite spending most weekends on campus - the best plan to satisfy all of your dining requirements
3,000	students with a good appetite spending many weekends on campus
2,600	students with an average appetite spending some weekends on campus
2,000	students with smaller appetites spending the odd weekend on campus
1,800	students with very small appetites spending little or no weekends on campus

[1] *Source*: University of Alberta Residence Services web page

Aramark has franchise agreements with Burger King™, Tim Horton's™, Extreme Pita™, Booster Juice™, Funky Pickle Pizza Co. ™, Pizza Pizza™, and Mr. Sub™ on campus. The reason for this, according to the Marketing Program Manager, is "so that we can use their suppliers and their branding, because we know that students want those brands."

4.3.3 University of Alberta

4.3.3.1 Individual Business Contracts

A qualitative interview was conducted with the Associate Director of Commercial Property Management. The duties of the Associate Director include overseeing commercial leases in all university-owned buildings including HUB mall, which is a mall and student residence on the University of Alberta campus. HUB mall alone houses 22 food outlets, and thus the Associate Director was chosen as an appropriate candidate to interview. The Associate Director reported that the university administration had no formal food-related policies. In HUB mall, as in

SUB, however, there were a number of exclusive contracts or guaranteed market niches (see Table 15).

Table 15: HUB mall tenants and corresponding market niches

Tenant	**Market Niche**
Java Jive	Gourmet coffee
A&W	Hamburgers
Edo Japan	Japanese-type food
Ho Ho Chinese food	Chinese-type food
Sweets & Treats	Bulk candy
International Fare and Academy Pizza	No more than two vendors may sell pizza
Pita Pazzaz	Greek-type food
New York Fries	Fresh-cut French fries

The Associate Director reported that although there are no formal food-related policies, the University of Alberta informally prefers to retain mostly small food businesses that are not franchises because small food businesses engender a sense of community more so than large franchises or other large food businesses. In addition, the Associate Director indicated that due to the large international citizenship of students at the University of Alberta, there are many and varied ideas of "healthy foods" and thus the administration attempts to bring in a variety of foods (including ethnic foods) in order to satisfy the demands of its multicultural audience. Similar to Aramark's Marketing Program Manager, the Associate Director indicated that student demand determines whether outlets that sell healthy foods thrive or fail.

4.3.3.2 Overarching Exclusivity Contracts

The Manager of Support Services and Ancillary Services (hereafter Manager) was

also interviewed. The Manager oversees the University of Alberta's contracts with Aramark, Edmonton Coin Vending and Coca-Cola Bottling Ltd. The Manager indicated that although she could not provide access to the contracts due to confidentiality reasons, she was still able to provide information pertinent to the current study.

First, the Manager reported that the University of Alberta's contract with Aramark stipulates that Aramark has the first right of refusal for any food service outlet location. Aramark provides catering to University events and owns 21 of the 85 food outlets on campus (including its corporate partnerships, lunch rooms and cafeterias). The Manager indicated that a student ombudsperson had recently been hired in order to deal with student complaints about Aramark's food or services. She reported that although Aramark did its best to deal with student concerns, some requests were not feasible given the cafeteria facilities. For example, although the cafeteria in Lister Centre provides vegetarian (and often vegan) options, kosher meals are not provided due to space and resource limitations.

Second, the Manager reported that Edmonton Coin Vending has an exclusive contract with the University of Alberta to provide all vending services other than those covered by the contract with Coca-Cola Bottling Ltd. Specifically, Edmonton Coin Vending provides pre-packaged snacks, dairy beverages, hot beverages (including coffee and hot chocolate), ice cream, and pre-packaged food (including sandwiches and instant soup). Edmonton Coin Vending, in addition to

paying the University of Alberta a sum of money for its exclusive vending rights, also has one scholarship per year available to a student at the University of Alberta.

Third, the Manager briefly discussed the University of Alberta's contract with Coca-Cola Bottling Ltd (hereafter Coke contract). She reported that all monies received from the Coke contract go to the student body in one way or another (see Table 15).The exclusive pouring rights contract began in June 1998 after results from a student referendum indicated that the majority of student voters favored the contract. According to the Manager, there is only one publicly accessible food outlet on the University of Alberta campus allowed to sell competitors' products due to an agreement between the outlet and PepsiCo Inc. implemented before 1998. Finally, the Manager reported that sales of bottled and canned Coca-Cola products from food outlets have been rising, while sales of Coca-Cola fountain drinks and vending products have been declining. If the contractual "minimum vending volume commitment" is not met by the time the contract comes up for renewal (2008), the contract will be extended (see section 4.3.4 below, regarding the Exclusive Pouring Rights Contract, for a discussion of the minimum vending volume commitment and penalties associated with failing to meet the commitment).

Table 16: Monetary donations to the University of Alberta community from Coca-Cola Bottling Ltd. between June 1998 and May 2005[1]

Benefit to the University Community	**Amount ($)**
Financial Aid	1,500,862.10
Student Awards	1,500,862.10
Faculty of Graduate Studies and Research	333,524.91
Students' Union	398,824.39
Coke Scholarships	70,000.00
Activation Funds	173,203.00
Total	3,977,276.50

[1] *Source*: Personal Communication, Manager Support Services, Ancillary Services

4.3.4 Exclusive Pouring Rights Contract

Fortunately for the current study, in 2005 the Editor-in-Chief of the University of Alberta student newspaper went through the lengthy process of requesting access to the Coke contract from the Information and Privacy Office under the *Freedom of Information and Protection of Privacy Act (FOIPP).* After several months of consultation, most of the Coke contract was provided (unfortunately excluded from the received document were many dollar amounts and several important definitions). The following results come directly from the contract.

The exclusive pouring rights pertain to all drinks other than dairy products, spirits, beer and wine, V-8, tomato juice, bottled water in large office units, hot chocolate, coffee and hot tea. The pouring rights extend not only to the University of Alberta campus, but also to any events that take place on campus (p.27). The Non-Competition clause in the Coke contract states:

The University and the Students' Union will ensure that, except as otherwise stated in this Agreement:

(a) no Cold Beverage Products are sold on Campus;

(b) no manufacturers or distributors of Cold Beverage Products are permitted to advertise on Campus, including trademark visibility, promotional rights, or the appearance of an association with the Campus, the University or the Students' Union;

(c) no member of the University's athletic teams will be permitted to use the University name, that athletic team name, trademark or uniform in connection with the sponsorship or endorsement of Cold Beverage Products;

(d) the University will promptly oppose any attempts by any manufacturer or distributor of Cold Beverage Products to associate with the University athletic teams in any fashion. (p.28)

The contract contains a single statement regarding nutrition value of Coke products:

> Coca-Cola recognizes the concern of the University and the Students' Union to ensure an available choice of Beverages containing appropriate nutritional value. During the Term, Coca-Cola will make available in its over-the-counter and bulk sales at least two (2) juices which contain 100% juice from concentrate (in accordance with the standards set by a mutually agreed upon authority) and which are competitive in nutritional value. (p. 12)

The Coke contract also specifies Coca-Cola's advertising and marketing strategies, including local marketing and promotional support (as determined by the Joint Beverage Committee), purchasing and installing athletic scoreboards and timing devices bearing the Coca-Cola logo and promotional programs (as determined in conjunction with the University and the Students' Union). In addition, Coca-Cola is provided with annual advertising rights at no additional cost, including:

> on Campus in various publications, vending machine fascia, signage at the University of Alberta athletic venues, Students' Union publications, video displays within the SUB and elsewhere on campus, and through the supply of sports drinks and trademark cups, coolers and squeeze bottles for use by University athletic teams and visiting athletic teams. (p.30)

Finally, Coca-Cola has the right of first refusal to buy advertising space on any new signage, provided that no advertising space will be sold to any competitors.

The Coke contract encourages the University to implement an Electronic Card system for the purchase of Coca-Cola products. In addition, the contract permits Coca-Cola to place additional vending machines in "common and support areas" adjacent to Aramark food outlets.

As previously mentioned, the contract outlines a "Minimum Vending Volume Commitment." The contract received through the *FOIPP* procedure unfortunately omits the number of units constituting the "Minimum Vending Volume Commitment." According to the contract, however:

> If the Minimum Vending Volume Commitment is not satisfied within the Term, the University and the Students' Union will extend the Term for the number of months required to satisfy the Minimum Vending Volume Commitment, up to a maximum of twenty-four (24) months. (p.21)

4.3.5 Food-Related Policies: Summary and Interpretation

4.3.5.1 Policies

Because policies affect everyone in the population, they can influence large numbers of people, regardless of the strength of their influence. The literature

is rife with suggestions for healthy public food policy interventions that could be applicable to the current study, including limited access to vending machines at schools (French et al., 2001; Fried & Nestle, 2002), approving menus for food service providers (Raine, 2005), providing quick, healthy and affordable meals and snacks on college campuses (Haberman & Luffey, 1998a), and requiring food outlets to provide nutrition information (Nestle & Jacobson, 2000). Several authors have suggested that healthy public food policies implemented at schools demonstrate the school leadership's commitment to healthy, provide guidance and direction for school and food service staff, and ensure accountability for action (French, Story & Fulkerson, 2002; Wechsler et al., 2001). That the University of Alberta community had not one single healthy public food policy indicates an important opportunity for improvement in the food environment.

The three food-related governing agencies at the University of Alberta (Aramark, the Students' Union and the University of Alberta administration) had few food-related policies. Of the nine formal and informal policies affecting food availability, none advocated for the provision of healthy foods, which indicates a lack of interest in promoting healthy food behaviors on behalf of the decision-makers at the University of Alberta. The two formal Students' Union food-related policies (Ethical Business Partners and Table Displays and Bookings), both of which only very minimally influence food availability, represented the only non-contractual policies developed by a governing body of the University of Alberta. For example, the Students' Union Ethical Business Partners policy is the reason it

sells Fair-Trade coffee. Both fair-trade and conventionally traded coffee are considered "Not Recommended" foods, according to the B.C. guidelines (2005). In other words, the Ethical Business Partners policy is motivated by a desire to improve business practices rather than to improve nutrition. Second, given that bake sales and other food-related sales from students groups occur only infrequently, the Table Displays and Bookings policy also has a very minimal impact on food availability.

Upon questioning, each of the key informants spoke of supply and demand, the responsibility of the organization to its business partners (franchises in the case of Aramark, tenants at SUB or HUB mall in the cases of the Students' Union or the administration, respectively), and the rights of students to choose. Two points of interest arise with the previous statement. First, all three key informants spoke only of the rights of *students* to choose. Second, this statement was always made in the context of allowing students to make less healthy food choices. Apparently, there is little concern over (or expectation of?) staff making less healthy food choices, and an assumption that students want to and will make less healthy food choices. Of note, these assumptions are, in fact, consistent with the literature showing that post-secondary students tend to have poor diets and food behaviors (Anding et al., 2001; Brevard & Ricketts, 1996; Buscher et al., 2001; Georgiou et al., 1997, Haberman & Luffey, 1998a; Hertzler & Frary, 1989; Huang et al., 2003; Racette et al., 2005; Shuette et al., 1996). According to the interviews undertaken in the current study, it seems that the predominant notion of the governing bodies

is that business interests (i.e. supplying the demand of students) conflict with health interests, at least with regard to food, and especially in the context of students. This idea is a problematic one, and is even more concerning given that it was espoused by all three governing bodies (the administration, Aramark, and the Students' Union). Specifically, who then, takes responsibility for the health of students?

Because there are so many varied reasons for the poor dietary practices among post-secondary students, policy-making bodies have many explanations at their disposal for their lack of action. First, policy-makers may point to the declining quality of diets from childhood to adolescence (Lytle, et al., 2000; Morton& Guthrie, 1998) as evidence that their policies may not make any change and thus may just waste time and resources. Policy-makers may also point to the variety of new challenges that face new post-secondary students, which may lead them to establish poorer eating habits, including developmental, environmental and social transitions as further evidence that their policies may be ineffective. Finally, as evidenced by the current study, policy makers may be more focused on their business relationships than the health of their students, and may point to student choice and individual responsibility to justify offering a plethora of unhealthy foods.

Given that policy-makers may be hesitant to develop and enforce health-promoting food policies on campus, advocates for such policies must strive to

make several things clear. First, meals and snacks consumed during school hours make a major contribution to the day's total energy and nutrient intake (French et al., 2003; Kubik et al., 2003). Second, the age at which many students enter university is between 17 and 18. Thus, many students, upon entering university, are not technically adults. Add to this the fact that many students are living away from home for the first time and, considering all the related stresses, it may not be reasonable to assume that first and second-year students are entirely capable of making informed, responsible food choices, particularly if the food environment is an 'obesogenic' one. As previously mentioned, post-secondary staff have been called upon to become proactively involved in promoting the health of their students (Haberman & Luffey, 1998b; Lowry, et al., 2000), particularly since they have a vested interest in the health of the people they serve (Seymour, et al., 2004). Healthy public food policy interventions with the general aim of restricting or limiting the consumption of energy-dense, high-fat or high-sugar foods (Drewnowski & Levine, 2003) or of encouraging the consumption of fresh, nutrient-rich foods (Fried & Nestle, 2002) should be advocated by decision-makers. Such a call to action echoes the Senate Task Force on Wellness report recommendations and is complemented by the Students' Union General Survey. Despite this, for reasons just discussed, nothing has yet been done in the way of policy-making to improve the health of the food environment at the University of Alberta.

4.5.3.2 Exclusivity Contracts

The number of exclusivity contracts between soda companies (e.g. Pepsi Co. and Coca-Cola) has increased dramatically over the last several years (French et al., 2001). Such contracts represent a detriment to the food environment because they tend to increase the availability of "Not Recommended" foods and beverages, as seen in the current study. Going to decision-makers armed only with this argument for reducing or eliminating exclusivity contracts, however, will likely do little to address this problem. Vending machine revenue has been identified as a pivotal issue to local decision-makers when considering whether to implement contracts or policies that would significantly change the food environment (French, Jeffrey, et al., 1997; French, Story et al., 1997; French et al., 2001; French et al., 2002; French & Wechsler, 2004). Thus, in order to 'sell' the idea of prohibiting exclusivity contracts representing a deterioration of the food environment, advocates must offer suggestions for alternate sources of revenue.

Both exclusivity contracts (Coca-Cola for cold beverages and Edmonton Coin Vending for vending machine products) increase the availability of "Not Recommended" foods: soda and sugary drinks from Coca-Cola and chips, chocolate, candy and ice-cream from Edmonton Coin Vending. Such contracts between schools and Pepsi Co. or Coca Cola have increased dramatically over the last several years (French et al., 2001), so in this regard, the University of Alberta is not unique. Several policies, including the two guaranteed market niche policies

and Aramarks' mandatory meal plan for Lister Centre residents, determine (and in the case of Aramark's mandatory meal plan, restrict) students' food choices on campus without giving thought to the health consequences of the food that is being supplied. Both the overarching exclusivity contracts and the individual market niche contracts support the agreed-upon notion of the three governing bodies that food on campus is a business. It seemed apparent from the interviews with all three participants, that health concerns played a minor role in determining the availability of food on campus.

4.4 Information Environment

4.4.1 Student Newspaper

There were 282 food-related advertisements and eight food-related articles in the student newspaper between February 3, 2005 and February 2, 2006. Of the 282 food advertisements, 210 advertised bars and clubs, 18 advertised coffee outlets, 15 advertised sandwich outlets, 12 advertised smoothies outlets, nine advertised the campus food bank, nine advertised pizza and/or pizza outlets, five advertised sit-down restaurants, and four advertised Coca-Cola. Table 17 summarizes these findings.

Table 17: Student newspaper advertisements - type, number, and size

Type of advertisement	Number	Mean area (cm^2)	Range (cm^2)
Bar or night-club	210	242	32-1000
Coffee outlets	18	138[a, b]	12-400
Sandwich outlets	15	152[a, b]	80-225
Smoothies outlets	12	131[a, b]	80-150
Campus food bank	9	173[b]	120-230
Pizza/Pizza outlets	9	308	16-380
Sit-down restaurant	5	202	80-345
Coca-Cola[1]	4	250	247-260

[1] Of note, these advertisements are free of charge to Coca-Cola as part of the Coke contract

[a] Indicates statistically significantly smaller mean area than bar advertisements using regression analysis with categorical independent variables

[b] Indicates statistically significantly smaller mean area than pizza advertisements using regression analysis with categorical independent variables

Bar advertisements were significantly larger than coffee advertisements (p=0.001), sandwich advertisements (p=0.006) and smoothies advertisements (p=0.002). Pizza advertisements were significantly larger than coffee advertisements (p=0.001), sandwich advertisements (p=0.003) smoothies advertisements (p=0.001) and campus food bank advertisements (p=0.020).

See Table 18 for a description of the secondary themes. The 210 bar and night-club advertisements were further broken down into advertisements for alcohol (n=91), events (n=65), food (n=8) and miscellaneous (including non-alcoholic beverages, grand openings, reminders to customers to carry ID, etc.) (n=46). Of the 65 advertisements for events, 27 also advertised alcohol. The mean area comparisons revealed no statistically significant differences.

Table 18: Bar and night-club ads secondary subjects

Secondary Theme	Number	Mean area (cm^2)	Range (cm^2)
Alcohol	91	221	32-400
Events	65	299	32-1000
Food	8	265	150-600
Miscellaneous	46		

No statistically significantly differences in mean area were found using regression analysis with categorical independent variables

There were eight food-related articles in the student newspaper between February 3, 2005 and February 2, 2006. Of the eight articles, three were instructional in nature (i.e. where to go on campus for coffee, good food, etc; where to go for cheap food on campus, and; recipes categorized as "how to eat cheaply"), two were criticisms of the Students' Union (i.e. for the exclusive pouring contract with Coca-Cola, and; for failing to provide enough microwaves for students that choose to bring lunch from home), two were informative in nature (i.e. one detailed campus services that aim to improve eating habits among University of Alberta students and the other outlined the previously discussed results of the Students' Union general survey) and one was a weekly feature wherein students are asked to respond to a general question. In this case, the question was, "What do you like better, butter or margarine?"

4.4.2 Undergraduate Handbook

Table 19 provides a description of the undergraduate handbook advertisements. There were 34 food-related advertisements in the Undergraduate handbook, including seven articles. Of the seven articles, six detailed Students' Union-owned establishments (including two bars, a sandwich outlet, a coffee outlet, a food

bank, and a convenience store) and one detailed the benefits of the Coke contract. Of note, the article detailing the Coke contract is part of the contract contract and thus Coca-Cola did not have to pay for that advertising space.

Of the remaining 27 advertisements, 10 advertised sit-down restaurants, six advertised bars or pubs, four advertised coffee outlet, two advertised smoothies outlet, one each advertised cafeterias, pizza outlets and sandwich outlets and two advertised alcohol (specifically, beer).

Table 19: Undergraduate handbook advertisements: type, number and size

Type of advertisement	Number	Mean area (cm^2)	Range (cm^2)
Sit-down	10	78	38-315
Bar/pub	6	57 [a]	38-70
Coffee outlet	4	55 [a]	38-70
Smoothies outlet	2	63 [a]	55-70
Alcohol (beer)	2	185	55-315
Cafeteria	1	55	n/a
Pizza outlet	1	55	n/a
Sandwich outlet	1	55	n/a

[a] Indicates statistically significantly smaller mean area than beer advertisements using regression analysis with categorical independent variables

Types of advertisements with an n of one (i.e. those for the cafeteria, pizza outlet and sandwich outlet) were excluded from analyses. Advertisements for beer were significantly larger than those of coffee outlets ($p=0.043$), bars or pubs ($p=0.035$) and smoothies outlets ($p=0.053$). All other comparisons were not statistically significant.

4.4.3 Graduate Handbook

Table 20 describes advertisements found within the graduate handbook. There were five food-related advertisements in the graduate handbook, including two articles: one about the campus food bank and one detailing the benefits of the Coke contract (again, advertising space for Coca-Cola that was granted for free by the Coke contract). Of the remaining three advertisements, one was for a sit-down restaurant, one was for pork ("Put pork on your fork") and one was for Alberta beef. There were too few ads to compare statistically.

Table 20: Graduate handbook advertisements: type and size

Type of advertisement	**Area (cm^2)**
Sit-down	78
Pork	18
Alberta beef	18

4.4.4 Student Radio Station

There were 10 distinct food related advertisements on the campus radio station that may have run multiple times between May 1, 2005, and March 31, 2006, including five for events in the community (e.g. fundraising dinners, international festivals), three for restaurants, one for a bar and one for the campus food bank. There were too few ads to compare statistically.

4.4.5 Information Environment: Summary and Interpretation

The vast majority of the health-related literature exploring the impact of food advertising on food intake has focused on children and adolescents (Institute of Medicine, 2005; Lobstein & Dibb, 2005). The influence of food advertising on adults' food intake has often been relegated to one or two lines in the discussion

section of youth-focused research papers. Such comments reflect current wisdom that adults are better able than children to judge advertisements critically, as well as to understand the intent and nature of advertisements. Adults, the thinking goes, are therefore not in need of protection from food advertising in the same way that children are. Despite the lack of literature, however, it seems reasonable to assume that the food industry would not spend billions of dollars on advertising food to adults if such tactics did not result in increased sales.

Much of the literature on food advertising uses content analysis to determine the proportion of different themes of advertisements in a given hour of television or magazine issue (Hastings et al., 2003). To my knowledge, there has been no accessible literature published on the impact of the size of advertisements on food choice. That said, there are two reasonable assumptions that may be made regarding the size of the advertisement and its impact on food choice. First, it is reasonable to assume that the larger the print advertisement, the more likely a reader is to see it, and thus be influenced by it. Second, given that outlets or product companies often have to pay by the square inch or centimeter for advertising space, it seems reasonable that they would only spend the money if the advertisement was worthwhile for them (in terms of improved sales).

Bars were the most frequently advertised outlet/theme in the student newspaper (n=210 bar advertisements vs. n=72 for all other advertisements combined). In addition to being the most frequently advertised, they were also among the largest

advertisements. Although the food environments of bars were not assessed, the high proportion of alcohol advertisements as secondary themes to bar advertisements may speak to the high frequency of alcohol being advertised to post-secondary students. Given that exposure to alcohol advertising has been associated with an increased prevalence of drinking among youth (Snyder, Milici, Slater, Sun & Strizhakova, 2006), these findings may be particularly concerning, especially considering the potentially harmful effects of alcohol.

4.5 Consumer Nutrition Environment

For purposes of organization and clarity, summaries and interpretations will follow, where appropriate, after each section. Data collected under the umbrella of the consumer nutrition environment were too plentiful to discuss coherently in one section.

4.5.1 Food Availability

4.5.1.1 Kiddie-sizing

Only one food outlet (a sandwich outlet) of 85 offered "kiddie-sized" meals, i.e., smaller-sized portions available to any customer.

4.5.1.2 Super-sizing

Seven of 85 food outlets offered super-sized options, including three burger outlets (of five total), two sandwich outlets (of 16 total) and two Asian outlets (of eight total). Asian outlets were significantly more likely to super-size menu options than coffee outlets ($p=0.048$). Burger outlets were significantly more

likely to super-size than all other types of outlets: Asian outlets (p=0.027), cafeterias (p=0.00), coffee outlets (p=0.00), pizza outlets (p=0.00), sandwich outlets (p=0.001), sit-down restaurants (p=0.001) and smoothies outlets (p=0.002). All other comparisons were not statistically significant.

4.5.1.2.1 Summary and Interpretation

Super-sized options were available most frequently from burger outlets and Asian outlets. Interestingly, upon further examination, every outlet that offered super-sized options was also a corporate franchise. One reason for this may be that the franchises offering super-sized options are targeting segmented customers. That is, customers who are more disposed to eat at these chains may also be the same ones who are likely to respond to super-sizing. An alternative explanation may be that people who tend to patronize these establishments do so when they are particularly hungry and are therefore more likely to choose a super-sized option when shopping at that spot. A final explanation for this phenomenon may be related to cost structures. For example, the low cost of adding extra rice and a tiny amount of beef or chicken to the "Sumo-Size" option in two Asian outlets or adding extra French fries and a few extra ounces of soda in burger outlets may represent an attractive option for customers and a cost-effective option for these types of outlets. Super-sized portions at other types of outlets may be more costly and thus not a worthwhile strategy for these outlets.

4.5.1.3 Wait times

Table 21 describes the average wait times associated with each type of food

outlet. Cafeterias had significantly longer wait times than coffee outlets (p=0.035). All other comparisons were non-significant.

Table 21: Wait times by type of food outlet

Type of Outlet	Number	Mean wait time (min)	Range (min)
Asian	5	3.5	1-8
Burger outlets	5	2.7	1-4
Cafeteria	8	5.9	1-11
Coffee outlets	11	2.8[a]	0-8
Pizza outlets	5	3.8	0-11
Sandwich outlets	18	4.2	1-10
Smoothies outlets	4	2.3	0-4

[a] Indicates statistically significantly shorter mean wait time than cafeterias using regression analysis with categorical independent variables

4.5.1.3.1 Summary and Interpretation

Although I am not aware of any peer-reviewed literature to indicate the impact of wait times on food choice, the literature does indicate that people's preference for convenience plays a role in food choice (Glanz, et al., 1998; Stewart, Blisard, Jolliffe, Bhuyan, 2005). Since wait times may be considered an operational definition of convenience, it is reasonable to assume that longer wait times are seen as less convenient for the consumer, and thus may have a negative impact on whether an individual will choose to visit a certain outlet. It also makes intuitive sense that students and staff, who often have a limited amount of time over lunch may make decisions of where to eat (and thus what to eat) based, at least in part, on how long they will have to wait in line. The fact that cafeterias have the longest wait times on average – significantly longer than coffee outlets – may discourage staff and students from visiting cafeterias compared to the other types of outlets. Given the following results (particularly with respect to the proportion

of healthy foods and great variety found in cafeterias), the long wait times at cafeterias may have a negative impact on the food choices of members of the University of Alberta community

4.5.1.4 Proportion of healthy food options by outlet type

Table 22 describes the proportion of healthy food options as they vary by the type of food outlet.

Table 22: Proportion of healthy meals, sides and beverages by type of outlet

Type of Outlet	Number[1]	Mean % healthy main meals	Number[2]	Mean % healthy sides or snacks	Number[3]	Mean % healthy beverages
Asian outlets	8	68[a]	7	15	7	28[d]
Burger outlets	5	9	5	14	4	28[d]
Cafeterias	10	65[a]	7	20	8	53
Coffee outlets	5	47[a, b]	12	11[c]	12	32[d]
Pizza outlets	7	12	5	21	6	22[d, e]
Sandwich outlets	18	53[a, b]	16	32	17	29[d]
Sit-down restaurants	5	47[a, b]	5	27	5	24[d]
Smoothies outlets	3	96[a]	4	23	4	45

[1] Includes all establishments that serve main meals

[2] Includes all establishments that serve sides or snacks

[3] Includes all establishments that serve beverages

[a] Indicates statistically significantly higher proportions of healthy main meals than burger and pizza outlets using regression analysis with categorical independent variables

[b] Indicates statistically significantly lower proportions of healthy main meals than smoothies outlets using regression analysis with categorical independent variables

[c] Indicates statistically significantly lower proportions of healthy sides and snacks than sandwich outlets using regression analysis with categorical independent variables

[d] Indicates statistically significantly lower proportions of healthy beverages than cafeterias using regression analysis with categorical independent variables

[e] Indicates statistically significantly lower proportions of healthy beverages than smoothies outlets using regression analysis with categorical independent variables

Burger and pizza outlets had significantly lower proportions of healthy main meals than Asian outlets (p=0.000 for both), cafeterias (p=0.000 for both),

coffee outlets (p=0.012 for burger outlets and p=0.011 for pizza outlets), sandwich outlets (p=0.001 for burger outlets and p=0.000 for pizza outlets), sit-down restaurants (p=0.015 for both) and smoothies outlets (p=0.000 for both). Smoothies outlets had a significantly higher mean proportion of healthy main meals than coffee outlets (p=0.006), sandwich outlets (p=0.006), and sit-down restaurants (p=0.008).

Sandwich shops had a significantly higher mean proportion of healthy sides and snacks than coffee outlets (p=0.034). All other comparisons were not statistically significant.

Cafeterias had a significantly higher mean proportion of healthy beverage options than coffee outlets (p=0.011), pizza outlets (p=0.002), sandwich outlets (0.003), sit-down restaurants (p=0.006), Asian outlets (p=0.008) and burger outlets (p=0.021). Smoothies outlets had a significantly higher mean proportion of healthy beverage options than pizza outlets (p=0.043).

Table 23 describes the mean numbers and ranges of healthy and unhealthy main meals by the type of food outlet.

Table 23: Mean numbers and ranges of healthy and unhealthy main meals by type of outlet

Type of Outlet	Number[1]	Mean number of healthy main meals	Range	Mean number of unhealthy main meals	Range
Asian outlets	8	12	2-38	8	0-36
Burger outlets	5	2[a]	0-7	21[c]	9-38
Cafeterias	10	12	1-30	4[b]	0-10
Coffee outlets	6	2[a]	0-7	4[b]	0-6
Pizza outlets	7	3[a]	0-10	17	3-47
Sandwich outlets	18	14	3-27	15	0-51
Sit-down restaurants	5	12	5-22	15	6-30
Smoothies outlets	3	5[a]	3-7	0.3[b]	0-1

[1] Includes all establishments that serve main meals

[a] Indicates statistically significantly lower mean number of healthy main meals than Asian outlets, cafeterias, sandwich outlets and sit-down restaurants using regression analysis with categorical independent variables

[b] Indicates statistically significantly lower mean number of unhealthy main meals than burger outlets, pizza outlets, sandwich outlets and sit-down restaurants using regression analysis with categorical independent variables

[c] Indicates statistically significantly higher mean number of unhealthy main meals than Asian outlets using regression analysis with categorical independent variables

Asian outlets, cafeterias, sandwich outlets and sit-down restaurants all had significantly more healthy main meal options available than burger outlets ($p=0.003$ for sandwich outlets to $p=0.048$ for sit-down restaurants), coffee outlets ($p=0.000$ for sandwich outlets to $p=0.013$ for sit-down restaurants), pizza outlets ($p=0.001$ for sandwich outlets to $p=0.039$ for sit-down restaurants) and smoothies outlets ($p=0.012$ for sandwich outlets to marginally significant $p=0.097$ for sit-down restaurants). Burger outlets, pizza outlets, sandwich outlets and sit-down restaurants had significantly more unhealthy main meal options than cafeterias ($p=0.004$ for burger outlets to $p=0.050$ for sit-down restaurants), coffee outlets ($p=0.001$ for burger outlets to $p=0.014$ for sit-down restaurants) and smoothies outlets ($p=0.004$ for burger outlets to $p=0.033$ for sit-down restaurants). In

addition, Asian outlets had significantly fewer unhealthy main meals than burger outlets (p=0.031).

Table 24 describes the mean numbers and ranges of healthy and unhealthy snacks and sides by the type of food outlet.

Table 24: Mean numbers and ranges of healthy and unhealthy snacks and sides by type of outlet

Type of Outlet	Number[1]	Mean number of healthy snacks/sides	Range	Mean number of unhealthy snacks/sides	Range
Asian outlets	7	2[a]	0-11	6[b]	1-14
Burger outlets	5	3	0-10	10	4-21
Cafeterias	7	10	2-30	45	16-128
Coffee outlets	12	3	0-16	32	5-65
Pizza outlets	5	2[a]	0-4	6[b]	1-15
Sandwich outlets	16	4	0-12	12[b]	0-34
Sit-down restaurants	5	8	1-21	15	6-21
Smoothies outlets	4	2	0-8	7[b]	2-13

[1] Includes all establishments that serve sides or snacks

[a] Indicates statistically significantly lower mean number of healthy sides and snacks than cafeterias using regression analysis with categorical independent variables

[b] Indicates statistically significantly lower mean number of unhealthy sides and snacks than cafeterias and coffee outlets using regression analysis with categorical independent variables

Cafeterias had significantly more healthy snacks and sides than Asian outlets (p=0.046) and pizza outlets (p=0.047). Sit-down restaurants had significantly more healthy snacks and sides than Asian outlets (p=0.059) and pizza outlets (p=0.058). Cafeterias and coffee outlets had significantly more unhealthy snacks and sides than Asian outlets (p=0.006 for cafeterias and p=0.004 for coffee outlets), burger outlets (p=0.047 for cafeterias and p=0.040 for coffee outlets), pizza outlets (p=0.006 for cafeterias and p=0.004 for coffee outlets), sandwich

outlets (p=0.009 for cafeterias and p=0.005 for coffee outlets) and smoothies outlets (p=0.035 for cafeterias and p=0.029 for coffee outlets).

Table 25 describes the mean numbers and ranges of healthy and unhealthy beverages by the type of food outlet.

Table 25: Mean numbers and ranges of healthy and unhealthy beverages by type of outlet

Type of Outlet	Number[1]	Mean number of healthy beverages[2]	Range	Mean number of unhealthy beverages[2]	Range
Asian outlets	7	4[a]	0-8	10	0-18
Burger outlets	4	3[a]	0-6	10	0-18
Cafeterias	8	13	0-44	17	0-51
Coffee outlets	12	8	2-34	17	5-29
Pizza outlets	6	3[a]	0-5	13	0-18
Sandwich outlets	17	6	0-18	16	0-36
Sit-down restaurants	5	4[a]	1-6	16	6-44
Smoothies outlets	4	10	7-15	18	4-34

[1] Includes all establishments that serve beverages

[2] Includes all non-alcoholic beverages

[a] Indicates statistically significantly higher mean number of healthy beverages than cafeterias using regression analysis with categorical independent variables

Cafeterias had significantly more healthy beverages than Asian outlets (p=0.004), burger outlets (p=0.009), pizza outlets (0.004), sandwich (p=0.007) and sit-down restaurants (p=0.014). All other comparisons were non-significant. There were no significant differences in the mean number of unhealthy beverages by outlet type.

4.5.1.4.1 Summary and Interpretation

The previous section made extensive use of the B.C. guidelines for the sales of food and beverages (Ministry of Education & Ministry of Health, 2005) to define healthy and unhealthy foods. Using the guidelines was an appropriate decision

since, as previously discussed, these guidelines represent the only explicit, easy-to-use, provincial, Canadian definition of "healthy" foods. According to these guidelines, burger outlets and pizza outlets had the lowest mean proportion of healthy main meal options (9% and 12%, respectively). This finding indicates the relative difficulty of obtaining a healthy main meal from these types of outlets, particularly when compared with the mean proportion of healthy main meals at smoothies outlets (96%).

Overall, the mean proportion of healthy snacks and sides was lower than the mean proportion of healthy main meals. Coffee outlets and smoothies outlets represent the two types of outlets that likely make up the bulk of their sales in snacks and sides (as evidenced by the fact that although 12 coffee outlets and four smoothies outlets sell snacks and sides, only five coffee outlets and three smoothies outlets sell main meals. In all other types of outlets, at least as many outlets sell main meals as sides and snacks). Coffee outlets had the lowest proportion of healthy snacks and sides, which may be significant due to the sheer number of coffee outlets selling snacks and sides. In addition, since 89% of snacks and sides at coffee outlets represent unhealthy food choices, the common practice of "coffee breaks" among staff and students may have implications for the health of the University of Alberta community, particularly if customers purchase a food item along with their beverage.

In general, most outlet types (other than coffee outlets, cafeterias, and smoothies)

had similar mean proportions of healthy beverages choices, ranging from 22% (for pizza outlets) to 29% (for sandwich outlets). In large part, this is due to the Coke contract requiring all outlets to carry certain Coca-cola products. Coffee outlets, cafeterias, and smoothies outlets tend to sell other beverages in addition to the requisite Coca-cola products. For example, the sale of hot beverages, dairy drinks, juices that are not made by "The Competitors", and smoothie-type drinks are all unbound by the Coke contract. It is of note, therefore, that the three types of outlets that were able to add to their repertoire of beverages had the three highest mean proportions of healthy beverages (53% for cafeterias, 45% for smoothies outlets and 32% for coffee outlets). In the case of cafeterias and smoothies outlets, the differences in the mean proportion of healthy beverages were significant. These results support the discussion in section 4.3.5.2, indicating that the Coke contract has increased the proportion of "Choose Least" and "Not Recommended" beverages on campus.

Asian outlets, cafeterias, sandwich outlets and sit-down restaurants had the highest mean numbers of healthy main meals, while burger outlets, pizza outlets, sandwich outlets and sit-down restaurants had the highest mean number of unhealthy main meals. The fact that sandwich outlets and sit-down restaurants had a high mean proportion of both healthy main meals and unhealthy main meals may simply indicate that these types of outlets have more variety compared with other outlets, and thus may not impact food choice. Similarly, cafeterias had significantly more healthy sides and snacks and more unhealthy sides and snacks

than several other outlets, reflecting the wide variety of foods available from this type of outlet. In other words, measuring the mean proportion of healthy main meals may be a more informative measure in determining the influence of food availability on food choice. In keeping with the previously discussed results of proportions of healthy beverage options, the mean numbers of unhealthy beverage options ranged from ten to 18 and were not significantly different from one another, likely because of the requisite Coca-cola products sold within each food outlet.

4.5.1.5 Healthier preparation options

Table 26 describes the types of healthier preparation options by the types of food outlets. Twelve of the 18 sandwich shops allowed whole wheat bread choices instead of white bread and all did so at no extra cost. Of the 10 cafeterias, four allowed whole wheat bread choices instead of white bread. One of the five burger shops offered baked potatoes instead of French fries for no additional cost. Also of interest, but not technically a healthier preparation option (since it does not represent a healthier way of preparing the same food), two of the five sit-down restaurants offered salad instead of French fries for an additional $1.50 (garden salad) or $2.00 (Caesar salad).

Table 26: Proportion of outlets offering healthier preparation options

Type of Outlet	Proportion of outlets offering healthier preparation options (%)	Type of healthier preparation option
Asian outlets	0	N/A
Burger outlets	20	Baked instead of French-fried potato
Cafeterias	40	Whole wheat instead of white bread
Coffee outlets	0	N/A
Pizza outlets	0	N/A
Sandwich outlets	67	Whole wheat instead of white bread
Sit-down restaurants	0	N/A
Smoothies outlets	0	N/A

4.5.1.5.1 Summary and Interpretation

The most common type of healthier preparation option was whole wheat bread instead of white bread, with 40% of cafeterias and 67% of sandwich outlets offering this choice. Only one food outlet offered baked instead of French-fried potatoes. No other healthier preparation options were observed. It seems, therefore, that lower fat or otherwise healthier preparation options are not a focus of food outlets on the University of Alberta campus. If this issue were to be taken up with decision-making bodies or even with the tenants who own the food outlets, one likely justification for this finding (based upon the previously described interviews with the key informants) is that healthier food is available on campus, and if students were really concerned about the health of their diets, they would choose different foods all together, rather than asking for their food to be prepared in a healthier manner.

4.5.1.6 Availability of certain foods

The availability of certain foods was determined by establishing the mean proportion of food outlets selling the specific items. See Table 27 for a description of the proportion of outlet types selling specific items.

Table 27: Mean Proportion of establishments selling specific items

Type of Outlet	Number	Chips (%)	Baked chips (%)	White bread (%)	Whole wheat bread (%)	Juice (%)	Non-fat or 1% milk (%)
Asian outlets	8	0	0	0	0	75	38
Burger outlets	5	20	0	80	0	60	0
Cafeterias	12	42	33	75	75	83	75
Coffee outlets	13	15	8	54	46	77	62
Pizza outlets	7	29	14	29	0	86	0
Sandwich outlets	16	31	38	94	94	94	31
Sit-down restaurants	5	0	0	100	40	100	60
Smoothies outlets	5	0	20	80	0	100	100

Table 27 continued: Mean Proportion of establishments selling specific items

Type of Outlet	Number	Low fat salad dressing (%)	Fresh fruit (%)	Non-fried veggies (%)	Diet pop (%)	Main dish salads (%)
Asian outlets	8	0	0	13	88	13
Burger outlets	5	40	0	0	80	20
Cafeterias	12	33	50	50	67	42
Coffee outlets	13	8	8	15	62	8
Pizza outlets	7	14	0	29	86	29
Sandwich outlets	16	50	19	94	94	75
Sit-down restaurants	5	20	20	60	100	80
Smoothies outlets	5	20	60	20	80	20

In order to clarify these results and make them meaningful, outlet types were ranked such that the highest proportion of outlets selling the item was ranked "1" and the lowest proportion of outlets selling the item was ranked last. The

exception to this was Chips and White bread, where the ranking system was reversed (in order to acknowledge their status as "Not recommended" and "Choose least", respectively). In cases where the same proportion of two or more outlets sold a given item, the outlets share a ranking for that particular item (e.g. 20% of burger outlets and 20% of smoothies outlets sell main dish salads and thus shared a ranking for that item). Ranks were averaged to provide the final ranking score. Rankings may be considered a proxy index of the health of the food environment at each type of outlet based on the availability of the eleven items observed. Sandwich outlets ranked first, followed by sit-down restaurants, smoothies outlets, cafeterias, pizza outlets, coffee outlets, Asian outlets, and burger outlets.

Table 28: Rank of outlet types according to the availability of specific foods

Type of Outlet	Number	Rank
Asian outlets	8	7
Burger outlets	5	8
Cafeterias	12	4
Coffee outlets	13	6
Pizza outlets	7	5
Sandwich outlets	16	1
Sit-down restaurants	5	2
Smoothies outlets	5	3

4.5.1.6.1 Summary and Interpretation

The availability of certain foods was a measure adapted from Lewis et al. (2005). Sandwich outlets, sit-down restaurants and smoothies outlets ranked in the top three for availability of these items, and indicate the variety available from each type of outlet. The rankings are considered a proxy index for the availability of

healthy choices in each type of outlet. One limitation of this measure, however, is reflected in the fact that Asian outlets were ranked second to last, but these results were not confirmed by the proportion of healthy foods available (see section 4.5.1.4). Specifically, this measure may be limited by the fact that it applies more appropriately to North American cuisine and may not be applicable to ethnic food outlets. On the other hand, that burger outlets were ranked last reflects the findings in section 4.5.1.4 indicating the low proportion of healthy food options. This measure, while providing some agreement with the proportion of healthy food options available, should be carefully tested in a variety of ethnic-type cuisines in order to ensure its validity.

4.5.2 Food Affordability

The number of choices selected from each food outlet ranged from one to six and reflected the variety and range of foods available at a particular establishment. For example, only a donut was selected from a coffee shop that sold only regular coffee and donuts. Conversely, at one large cafeteria, six items were selected to represent the diverse range of foods available there. See appendix D for raw data associated with the following means and statistical comparisons. As evidenced by appendix D, there was a wide variability in energy cost. For example, one chocolate muffin from a sandwich outlet gave a whopping 667 kcal/$, or $0.15/100 kcal. Buying a bag of 12 cookies from a coffee shop provided 642 kcal/$ or $0.16/100 kcal per cookie. Salad from one cafeteria, on the other hand, provided only 10 kcal/$ or $9.78/100 kcal. Similarly, a "veggie cup" provided 21

kcal/$ or $4.67/100 kcal.

Table 29 provides the food outlet comparisons of mean energy density of typical foods. The mean energy density of typical foods from each type of outlet was calculated and compared using regression analysis with categorical independent variables (type of outlet). The bold numbers represent the mean energy density of typical foods from each type of food outlet, and the p=X values represent the p values associated with the significant differences. The term NSD represents a comparison that revealed no statistically significant difference.

Table 29: Food outlet comparison of mean energy density (kcal/g) of typical foods

	Asian	**Burger**	**Cafeteria**	**Coffee**
Asian	**1.34**	p=0.001	NSD[1]	p=0.000
Burger		**2.51**	p=0.000	NSD
Cafeteria			**1.60**	p=0.000
Coffee				**2.84**
Pizza				
Sandwich				
Sit-Down				
Smoothies				

[1] NSD: No significant difference using regression analysis with categorical independent variables

Table 29 cont'd: Food outlet comparison of mean energy density (kcal/g) of typical foods

	Pizza	**Sandwich**	**Sit-Down**	**Smoothies**
Asian	NSD	NSD	NSD	NSD
Burger	NSD	p=0.000	NSD	p=0.000
Cafeteria	NSD	NSD	NSD	NSD
Coffee	p=0.000	p=0.000	p=0.022	p=0.000
Pizza	**2.09**	NSD	NSD	NSD
Sandwich		**1.63**	NSD	NSD
Sit-Down			**2.04**	NSD
Smoothies				**1.01**

Typical foods from Asian outlets had a significantly lower mean energy density than burger outlets (p=0.001) and coffee outlets (p=0.000). Typical foods from burger outlets had a significantly higher mean energy density than those from cafeterias (p=0.000), sandwich outlets (p=0.000) and smoothies outlets (p=0.000). Typical foods from coffee outlets had a significantly higher mean energy density than those from cafeterias (p=0.000), pizza outlets (p=0.021), sandwich outlets (p=0.000), sit-down restaurants (p=0.022), smoothies outlets (p=0.000).

Table 30 describes food outlet comparisons of the mean energy costs of typical foods. The bold numbers represent the mean energy density of typical foods from each type of food outlet, and the p=X values represent the p values associated with the significant differences. The term NSD represents a comparison that revealed no statistically significant difference.

Table 30: Food outlet comparison of mean energy cost ($/100kcal) of typical foods

	Asian	**Burger**	**Cafeteria**	**Coffee**	**Pizza**	**Sandwich**	**Sit-Down**	**Smoothies**
Asian	**0.93**	NSD[1]	NSD	NSD	NSD	NSD	NSD	NSD
Burger		**0.65**	p=0.002	NSD	NSD	p=0.045	NSD	p=0.025
Cafeteria			**1.52**	p=0.000	NSD	NSD	NSD	NSD
Coffee				**0.60**	NSD	p=0.014	NSD	p=0.012
Pizza					**0.90**	NSD	NSD	NSD
Sandwich						**1.20**	NSD	NSD
Sit-Down							**1.02**	NSD
Smoothies								**1.51**

[1] NSD: No significant difference using regression analysis with categorical independent variables

The mean energy cost of typical foods from each type of outlet was calculated and compared using regression analysis with categorical independent variables (type of food outlet). Burger outlets had a significantly lower mean energy cost for

typical foods than cafeterias (p=0.002), sandwich outlets (p=0.045) and smoothies outlets (p=0.025). Coffee outlets also had a significantly lower mean energy cost for typical foods than cafeterias (p=0.000), sandwich outlets (p=0.014) and smoothies outlets (p=0.012).

Table 31 compares the mean energy density by the type of food. The mean energy density of each type of food was calculated and compared using regression analysis with categorical independent variables (type of food). The bold numbers represent the mean energy density of typical foods from each type of food outlet, and the p=X values represent the p values associated with the significant differences. The term NSD represents a comparison that revealed no statistically significant difference.

Table 31: Type of food comparison of mean energy density (kcal/g)

	Asian	**Burger**	**Fries**	**Sandwich**	**Salad**
Asian	**1.35**	p=0.000	p=0.000	p=0.006	NSD[1]
Burger		**2.42**	p=0.009	p=0.018	p=0.000
Fries			**3.10**	p=0.000	p=0.000
Sandwich				**1.93**	p=0.000
Salad					**1.10**
Pizza					
Sweets					
Fruit/Veg					
Hot Food					

[1] NSD: No significant difference using regression analysis with categorical independent variables

Table 31 cont'd: Type of food comparison of mean energy density (kcal/g)

	Pizza	**Sweets**	**Fruit/Veg**	**Hot Food**
Asian	p=0.000	p=0.006	p=0.005	NSD
Burger	NSD	p=0.000	p=0.000	p=0.000
Fries	p=0.001	NSD	p=0.000	p=0.000
Sandwich	NSD	p=0.000	p=0.000	NSD
Salad	p=0.000	p=0.000	NSD	NSD
Pizza	**2.26**	p=0.000	p=0.000	p=0.000
Sweets		**3.44**	p=0.000	p=0.000
Fruit/Veg			**0.63**	p=0.001
Hot Food				**1.42**

Sweets (including donuts, dessert squares and cookies) had the highest energy density and were significantly more energy dense than all other food types except fries (p=0.000 to p=0.006). Fries were also significantly more energy dense than most other food types (the one exception was sweets) (p=0.000 to p=0.001). Fruits and vegetables had a significantly lower mean energy density than all other food types (p=0.000 to p=0.005) other than salads.

Table 32 describes comparisons of the mean energy cost by type of food. The mean energy cost of each type of food was calculated and compared using regression analysis with categorical independent variables (type of food). The bold numbers represent the mean energy density of typical foods from each type of food outlet, and the p=X values represent the p values associated with the significant differences. The term NSD represents a comparison that revealed no statistically significant difference. Salads had a significantly higher mean energy cost than all other types of foods (p=0.000). Fruits and vegetables had a

significantly higher energy cost than fries (p=0.003), sweets (p=0.000) and hot food (p=0.025).

Table 32: Type of food comparison of mean energy cost ($/100kcal)

	Asian	**Burger**	**Fries**	**Sandwich**	**Salad**
Asian	**0.92**	NSD[1]	NSD	NSD	p=0.000
Burger		**0.82**	NSD	NSD	p=0.000
Fries			**0.44**	p=0.023	p=0.000
Sandwich				**1.08**	p=0.000
Salad					**3.11**
Pizza					
Sweets					
Fruit/Veg					
Hot Food					

[1] NSD: No significant difference using regression analysis with categorical independent variables

Table 32 cont'd: Type of food comparison of mean energy cost ($/100kcal)

	Pizza	**Sweets**	**Fruit/Veg**	**Hot Food**
Asian	NSD	NSD	NSD	NSD
Burger	NSD	NSD	NSD	NSD
Fries	NSD	NSD	p=0.003	NSD
Sandwich	NSD	p=0.001	NSD	NSD
Salad	p=0.000	p=0.000	p=0.000	p=0.000
Pizza	**0.84**	NSD	NSD	NSD
Sweets		**0.35**	p=0.000	NSD
Fruit/Veg			**1.45**	p=0.025
Hot Food				**0.73**

4.5.4 Food Affordability: Summary and Interpretation

In the current study, less healthy foods tended to have higher energy densities and lower energy costs than healthier foods. These results supports Drewnowski's

(2004) findings that there is an inverse relationship between energy density (kcal/g) and energy cost ($/kcal). These findings were to be expected, given the large and growing body of literature on food affordability and its effects on food intake at a population level (Drewnowski, 2004; Drewnowski et al., 2004; Drewnowski & Darmon, 2005a; Drewnowski & Darmon, 2005b; Drewnowski & Levine, 2003; Drewnowski & Rolls, 2005). The more interesting findings, in terms of assessing the food environment, were those suggesting that differences in energy density and energy cost can be seen not only among different types of foods, but among different types of food outlets. To my knowledge, no other studies have been published in the health literature to support or contradict these findings. It seems intuitive that the mean energy density and mean energy cost of typical foods sold at an outlet reflect the energy densities and energy costs of the typical foods, particularly when the food outlet has limited variety in food choice. That burger outlets and coffee outlets had the highest mean energy densities and the lowest mean energy costs is likely based on two reasons. First, burgers and fries (in the case of burger outlets) and cookies and squares (in the case of coffee outlets) have high energy densities and low energy costs. Second, most of the burger outlets and coffee outlets on campus had a limited variety. For example, of the five burger outlets on campus, only one sold salads in addition to their usual fare of burgers and French fries. Similarly, of the 13 coffee outlets on campus, only four sold healthier main meals or snacks (see section 4.5.2 for a discussion of the proportion of healthy foods available at each type of outlet). In outlets where there was much more variety in foods sold (e.g. in Asian outlets, cafeterias,

sandwich outlets and sit-down restaurants), there were fewer significant differences in mean energy densities and costs.

One limitation of this method of assessing food affordability is that only typical foods were assessed. Further, the definition of "typical foods", as previously mentioned, was fairly subjective. If the energy density and energy cost of every food in an outlet was assessed, likely there would be fewer significant differences in mean energy density and mean energy cost, since such an undertaking would also capture the "atypical foods" in outlets (e.g. salads at burger outlets and fresh fruit at coffee outlets). A further consideration, should this measure be refined, is that, as a participant in a recent Dateline documentary entitled "Food Fight" noted, "You don't go to McDonald's for the salad" (Dateline, 2006), implying that even if healthier options are available from a fast food outlet, the reason to go to a burger outlet is for the burgers and French fries. The validity of the participant's statement may be quantitatively investigated by comparing the number of "healthier options" (e.g. some salads or sandwiches) sold per year at a given fast food outlet with the number of "less healthy options" (e.g. burgers, French fries, et cetera.). One interesting theory is that healthier options may be promoted by these chains because they "win over the 'veto vote', offering something to the calorie-conscious eater who might otherwise dissuade a whole family or group from going to a KFC or Taco Bell" (Economist, 2005).

As previously discussed, a number of studies conducted in various

microenvironmental settings and with different audiences consistently indicated that decreasing the cost of targeted "healthy foods" resulted in increased consumption, regardless of visual promotion (French, Story, et al., 1997; French, Jeffery, et al., 1997; French, et al., 2001; French et al., 2003; French, 2003; Jeffery et al., 1994). French (2003) therefore advocates a strategy to simultaneously increase consumption of healthy foods and decrease consumption of unhealthy foods. The proposed strategy would implement small price increases on popular high fat foods and modest price reductions on lower fat foods, resulting in a potentially financially feasible, long-term strategy to promote healthful food choices. Hill and Peters (1998) also advocate for healthy, unprocessed foods to be made more affordable in order to increase their consumption. Before such strategies are implemented on the University of Alberta campus, however, previously discussed attitudes of the three governing bodies must be addressed (see section 4.3.5.1).

4.5.5 Food Promotion within Food Outlets

Table 33 describes the number of advertisements within each type of food outlet, as well as the proportion of advertisements that were categorized as unhealthy, healthy, or overeating. As previously noted, unhealthy advertisements were considered those that advertised "Choose Least" or "Not Recommended" foods, healthy advertisements were those that advertised "Choose Most" or "Choose Sometimes" foods and overeating advertisements advertised food options that allowed the greatest value per dollar (e.g. "Super-size", "Up-size", "Sumo-size",

"All you can eat", etc.).

Table 33: Number and proportion of different advertisement types by type of outlet

Type of Outlet	Number of Ads	% Unhealthy Ads[1]	% Healthy Ads[1]	% Overeating Ads[1]
Asian outlets	40	65[a, b]	20[c, d]	10[f]
Burger outlets	44	64[a, b]	2[c]	18
Cafeterias	141	60[a, b]	25[c, d]	1[f, g]
Coffee outlets	63	48[a, b]	10[c, e]	2[f, g]
Pizza outlets	35	86	3[c]	6[f]
Sandwich outlets	114	50[a, b]	25[c, d]	5[f]
Sit-down restaurants	7	29[a]	14[c]	0[f]
Smoothies outlets	55	25[a]	47	0[f, g]
Bars	33	100	0[c, e]	0[f, g]

[1] The percent of each type of ad may not add up to 100% because the subject matter of some ads fell beyond the scope of the four categories (e.g. ads for a contest, UDINE card accessibility, etc.). Alternatively, the percent of each type of ad may add up to more than 100% because the subject matter of some ads could belong to up to two groups (e.g. 12 ads focused on both unhealthy food and overeating).

[a] Indicates statistically significantly lower mean proportion of unhealthy advertisements than pizza outlets and bars using regression analysis with categorical independent variables

[b] Indicates statistically significantly higher mean proportion of unhealthy advertisements than smoothies outlets using regression analysis with categorical independent variables

[c] Indicates statistically significantly lower mean proportion of healthy advertisements than smoothies outlets using regression analysis with categorical independent variables

[d] Indicates statistically significantly higher mean proportion of healthy advertisements than burger and pizza outlets using regression analysis with categorical independent variables

[e] Indicates statistically significantly lower mean proportion of healthy advertisements than cafeterias and sandwich outlets using regression analysis with categorical independent variables

[f] Indicates statistically significantly lower mean proportion of overeating advertisements than burger outlets using regression analysis with categorical independent variables

[g] Indicates statistically significantly lower mean proportion of overeating advertisements than Asian outlets using regression analysis with categorical independent variables

All overeating advertisements also advertised unhealthy foods. The mean proportion of unhealthy advertisements was calculated and compared using regression analysis with categorical independent variables (type of food outlet). Bars and pizza outlets had the highest proportions of unhealthy advertisements – significantly higher than Asian outlets (p=0.001 for bars and marginally higher

for pizza outlets p=0.055), burger outlets (p=0.001 for bars and p=0.037 for pizza outlets), cafeterias (p=0.000 for bars and p=0.004 for pizza outlets), coffee outlets (p=0.000 for both), sandwich outlets (p=0.000 for both), sit-down restaurants (p=0.000 for bars and p=0.003 for pizza outlets) and smoothies outlets (p=0.000 for both). Conversely, smoothies outlets had a significantly lower mean proportion of unhealthy advertisements than Asian outlets, burger outlets, cafeterias (all p=0.000), coffee outlets (p=0.010) and sandwich outlets (p=0.001).

The mean proportion of healthy advertisements was calculated and compared using regression analysis with categorical independent variables (type of food outlet). Smoothies outlets had the highest mean proportion of healthy advertisements – significantly higher than bars, burger outlets, cafeterias, coffee outlets, pizza outlets, sandwich outlets (p=0.000), Asian outlets (p=0.001) and sit-down restaurants (p=0.031). Burger and pizza outlets had significantly lower mean proportions of healthy advertisements than Asian outlets (p=0.033 for burger outlets and p=0.052 for pizza outlets), cafeterias (p=0.001 for burger outlets and p=0.002 for pizza outlets) and sandwich outlets (p=0.001 for burger outlets and p=0.003 for pizza outlets). Cafeterias and sandwich outlets had significantly higher mean proportions of healthy advertisements than coffee outlets (p=0.008 for cafeterias and p=0.012 for sandwich outlets) and bars (p=0.001 for both).

The mean proportion of overeating advertisements was calculated and compared

using regression analysis with categorical independent variables (type of food outlet). Burger outlets had significantly more overeating advertisements than all other outlet types (p=0.000 for cafeterias, coffee outlets, sandwich outlets, smoothies outlets and bars to marginally fewer p=0.054 for Asian outlets). Asian outlets had significantly more overeating advertisements than cafeterias, coffee outlets, smoothies outlets and bars (p=0.008 for cafeterias to p=0.032 for coffee outlets).

Table 34 describes the number of each size of advertisement and the breakdown of unhealthy, healthy, and overeating advertisements of each size.

Table 34: Advertisement size and proportion of subject matter

Size	Number	% Unhealthy	% Healthy	% Overeating
Small	144	44	29	4
Medium	192	62[a]	19[b]	5
Large	193	71[a]	14[b]	4

[a] Indicates statistically significantly higher mean proportion of unhealthy advertisements than small advertisements using regression analysis with categorical independent variables
[b] Indicates statistically significantly lower mean proportion of unhealthy advertisements than small advertisements using regression analysis with categorical independent variables

The mean proportion of unhealthy advertisements was calculated and compared using regression analysis with categorical independent variables (size of advertisement). Small advertisements were less likely to advertise unhealthy foods than large- (p=0.000) or medium-sized (p=0.001) advertisements and more likely to advertise healthy foods than large- (p=0.001) or medium-sized (p=0.027) advertisements.

4.5.6 Food Promotion within Food Outlets: Summary and Interpretation

There has been much research done on the impact on food choice of food advertising within the information environment (i.e. food advertising on television and print materials). The impact of point-of-purchase information has also been studied (Buscher, et al., 2001 and Seymour, et al., 2004, for example). Point-of-purchase information, however, is often comprised purely of nutrition information, which cannot compete aesthetically with the "graphics-intensive, eye-catching commercial food promotions" in food outlets (Mayer, Dubbert & Elder, 1989). One study (Buscher, et al., 2001) developed aesthetically pleasing point-of-purchase posters that focused on taste, cost, convenience and energy value to promote healthy snack choices in a university cafeteria. The study concluded that the point-of-purchase intervention improved sales of yogurt and pretzels, and may be especially effective when the targeted foods are priced comparably to less healthy foods. If a point-of-purchase intervention can improve sales of healthy foods, it seems reasonable to assume that point-of-purchase advertisements for unhealthy items are at least equally likely to increase sales of unhealthy foods, even more so if less healthy food items are cheaper. Though there has been little (if any) peer-reviewed literature to support or contradict this assumption, the mere fact that so many food outlets advertise specific foods within their outlets seems to indicate that point-of-purchase advertising works to increase sales of the advertised item.

On average, the proportion of unhealthy advertisements was far greater than the proportion of healthy advertisements. Of all outlet types, smoothies outlets advertised unhealthy items least (25% of advertisements) and healthy items most (47% of advertisements). Conversely, pizza outlets advertised unhealthy options often (86% of advertisements) and healthy options very infrequently (only 3% of advertisements). It could be assumed that advertisements within food outlets merely reflect the food sold within the outlets. In other words, it seems intuitive that the proportion of healthy advertisements would reflect the proportion of healthy items available. This assumption seems to hold true for smoothies outlets (e.g. smoothies outlets have the highest mean proportion of healthy food available as well as the highest mean proportion of healthy advertisements and the lowest mean proportion of unhealthy advertisements). Other outlets also seem to fit this trend. For example, pizza outlets, with the second lowest mean proportion of healthy foods available, had a high mean proportion of unhealthy advertisements and a low mean proportion of healthy advertisements. Burger outlets also follow this trend, since they have the lowest mean proportion of healthy foods, the lowest mean proportion of healthy advertisements and a high proportion of both unhealthy advertisements (64%) and overeating advertisements (18%). In still other outlets, the relationship between the availability of healthy food and the proportion of healthy advertisements is less clear. For example, cafeterias and sandwich outlets have the second and third highest mean proportion of healthy options, respectively, yet 60% of advertisements in cafeterias and 50% of advertisements in sandwich outlets promoted unhealthy foods while only 25% of

each outlet's advertisements promoted healthy items.

As mentioned (section 4.4.5), to my knowledge there is no literature exploring the impact of the size of advertisements on food choice. Despite this, for reasons discussed in that section, the assumption in the current study is that the larger the advertisement, the more likely it is to influence food choice, other things being equal. If this is the case, it is noteworthy that healthy advertisements were more likely to be small and unhealthy advertisements were more likely to be large. Not only are unhealthy items being advertised more often within outlets, but they are also more likely to be large advertisements. This may have a detrimental effect on food choice.

4.5.7 Nutrition Information

4.5.7.1 Food Item Labels

Table 35 describes the health- or nutrition-related menu labels by the type of food outlet. Any food item that was associated with a health- or nutrition-related label on the menu or on a separate sign within the establishment was considered to be such a label. Health- or nutrition- related labels ranged from the words "healthy" or "nutritious" being associated with a food product to comments about the content of the food (e.g. high-fibre muffin) to vegetarian labels to organic or fair trade labels. Although the health impact of organic or fair trade food products compared to regular products is debatable, the reason these labels were considered to be health-related labels is that many people associate organic or fair trade foods

with being healthier than conventionally-farmed or traded foods. Similarly, although vegetarian meals are not necessarily healthier than meat dishes, many people associate vegetarianism with health, and thus vegetarian labels were considered to be health-related labels. There were no standardized program labels (e.g. Canadian Food Guide to Healthy Eating, official diabetic exchange labels, et cetera.) associated with any food items.

Table 35: Nutrition-related menu labels by type of outlet

Type of Outlet	Number	Number of restaurants with any menu labels	Minimum number of items labeled	Maximum number of items labeled
Asian outlets	8	2[a]	0	1
Burger outlets	5	1[a]	0	2
Cafeterias	14	3[a]	0	4
Coffee outlets	13	7[a]	0	4
Pizza outlets	8	4[a]	0	2
Sandwich outlets	17	8[a]	0	18
Sit-down restaurants	6	3	0	20
Smoothies outlets	4	2	0	21

[a] Indicates statistically significantly lower number of items labeled than smoothies outlets using regression analysis with categorical independent variables

Table 36 describes the mean proportion of items labeled in each of the following categories: Content; Vegetarian; "Healthy" or "Nutritious" and; "Organic" or "Fair Trade."

Smoothies outlets labeled significantly more items than Asian outlets (p=0.006), burger outlets (p=0.014), cafeterias (p=0.005), coffee outlets (p=0.009), pizza outlets (p=0.013) and sandwich outlets (p=0.038).

Table 36: Average proportion of items labeled using various labels

Type of Outlet	Content Label (% of items)	Vegetarian Label (% of items)	"Healthy" or "Nutritious" Label (% of items)	Organic or Fair Trade Label (% of items)
Asian outlets	0[a]	0[b, c]	0.25	0[e]
Burger outlets	0[a]	0.40	0[d]	0[e]
Cafeterias	0.29[a]	0.36[c]	0.43	0[e]
Coffee outlets	0.54	0	0.23[d]	0.46
Pizza outlets	0[a]	0.63	0.25	0[e]
Sandwich outlets	1.18	0.35	0.94	0.06[e]
Sit-down restaurants	0[a]	3.83	0[d]	0.33[e]
Smoothies outlets	0.5	0[c]	7.00	0.25[e]

[a] Indicates statistically significantly lower proportion of content labels than smoothies outlets using regression analysis with categorical independent variables
[b] Indicates statistically significantly lower proportion of vegetarian labels than pizza outlets using regression analysis with categorical independent variables
[c] Indicates statistically significantly lower proportion of vegetarian labels than sit-down restaurants using regression analysis with categorical independent variables
[d] Indicates statistically significantly lower proportion of "healthy" or "nutritious" labels than sit-down restaurants using regression analysis with categorical independent variables
[e] Indicates statistically significantly lower proportion of organic or fair trade labels than coffee outlets using regression analysis with categorical independent variables

Smoothies outlets were significantly more likely to label food on menus related to food content (i.e. amounts of fat, sugar, caffeine, fibre, etc) than Asian outlets ($p=0.002$), burger outlets ($p=0.021$), cafeterias ($p=0.019$), pizza outlets ($p=0.012$) and sit-down restaurants ($p=0.017$).

Pizza outlets were significantly more likely than Asian outlets ($p=0.044$) to label vegetarian options. Sit-down restaurants were significantly more likely than Asian outlets ($p=0.014$), cafeterias ($p=0.049$) and smoothies outlets ($p=0.038$) to advertise vegetarian options.

Smoothies outlets were significantly more likely to have labels describing "healthy" or "nutritious" options than were burger outlets (p=0.040), coffee outlets (p=0.041) and sit-down restaurants (p=0.033) to have these labels.

Coffee outlets were significantly more likely to advertise fair trade and organic ingredients than Asian outlets (p=0.004), burger outlets (p=0.014), cafeterias (p=0.001), pizza outlets (p=0.004) and sit-down restaurants (p=0.004) and sandwich outlets (p=0.003).

4.5.7.2 Available Nutrition Information

Table 37 describes the proportions of each type of outlet that provide nutrition information. Nutrition information was defined as any information about the content of the food (i.e. the calories per serving, micronutrients or macronutrients), or the number of servings of foods according to Canada's Food Guide to Healthy Eating. Nutrition information was considered "available" if it could be found online or in a pamphlet or poster within the food outlet.

Table 37: Proportion of outlets with nutrition information available

Type of Outlet	Proportion of outlets with nutrition information available (%)
Asian outlets	25[a]
Burger outlets	80
Cafeterias	0[a, b, c]
Coffee outlets	30[a]
Pizza outlets	50
Sandwich outlets	59
Sit-down restaurants	0[a, b, c]
Smoothies outlets	50

[a] Indicates statistically significantly lower proportion nutrition information available than burger outlets using regression analysis with categorical independent variables
[b] Indicates statistically significantly lower proportion nutrition information available than sandwich outlets using regression analysis with categorical independent variables
[c] Indicates statistically significantly lower proportion nutrition information available than pizza outlets using regression analysis with categorical independent variables

Burger outlets were significantly more likely to provide nutrition information than Asian outlets (p=0.025), cafeterias (p=0.001), coffee outlets (p=0.030), sit-down restaurants (p=0.003). Sandwich outlets were significantly more likely to provide nutrition information than were cafeterias (p=0.000) and sit-down restaurants (p=0.005). Pizza outlets were significantly more likely to provide nutrition information than sit-down restaurants (p=0.032) and cafeterias (p=0.009).

Cafeterias were significantly less likely to provide online nutrition information than burger outlets (p=0.009), pizza outlets (p=0.011) and sandwich outlets (p=0.010). Sit-down restaurants were significantly less likely to provide online nutrition information than burger outlets (p=0.024), pizza outlets (p=0.035) and sandwich outlets (p=0.047)

There were no significant differences between types of food outlets with respect to the availability of in-store nutrition information.

4.5.8. Nutrition Information: Summary and Interpretation

The literature is divided on whether or not the availability of nutrition information influences food choice, though most articles agree that nutrition information is underused by the general population (Higginson et al., 2002a; Higginson et al., 2002b; Martens et al., 1997; Westcombe & Wardle, 1997, Engell et al., 1998). Two very recent studies examined menu labels and consumer perceptions. One study found that slightly less than 60% of participants viewed nutrition as an important consideration when buying fast food (O'Dougherty et al., 2006). A slightly higher proportion of participants agreed that restaurants should be mandated to provide their customers with nutrition information. Another recent study found that 44% to 57% of participants reported that they were not likely to use food label information in restaurants even if it were available (Krukowski, Harvey-Berino, Kolodinsky, Narsana & DeSisto, 2006). Because the main finding in the nutrition information literature is that nutrition information is underused and often misunderstood by consumers, it is difficult to interpret the practical significance of the findings in the current study.

Of the 26 food outlets providing nutrition information, all were franchises. This fact further complicates the interpretation of these data. For example, the fact that burger outlets were most likely to offer nutrition information does not indicate

that their food offerings were healthier than other outlets. On the contrary, as evidenced by the previous discussions, burger outlets rate among the least healthy in terms of food offerings. Assessing the availability of nutrition information, may be more indicative of the company's resources to have food products nutritionally evaluated than whether the foods served are healthy or not. Alternatively, larger chains may be under more external pressure to provide nutrition information. Given the recent findings of O'Dougherty et al. (2006) and Krukowski et al. (2006), assessing the availability of nutrition information may not be a useful expenditure of time or resources when assessing the food environment.

4.6 Summary of Outlet Type Characteristics

Types of outlets were ranked in measures related to convenience, cost/value, health, advertising and food promotion within food outlets. Outlets were ranked such that the most convenient situations were ranked before less convenient situations; the highest cost/value situations were ranked before lower cost/value situations, healthier situations were ranked before less healthy situations, greater exposure in advertising was ranked before lesser exposure, and the higher mean proportion of desirable advertisements were ranked before lower proportions. Specific ranking strategies are discussed within each of the following sections. Ranks of each column were averaged to obtain the final rank of each outlet. Where averages were identical, the same rank was given.

4.6.1 Convenience

Types of outlets were ranked in three measures related to convenience (number of

outlets, hours of operation and wait times) to determine the convenience of visiting each type of outlet. Outlets were ranked such that the most convenient situations (e.g. the higher numbers of an outlet type, the longest hours of operation, and the shortest wait times) were ranked before less convenient situations. Weekday and weekend hours of operation were averaged to determine the rank of outlets in the "Hours of Operation" column. Based on the ranking system, coffee outlets are the most convenient type of outlet to visit, followed by burger outlets. Asian, pizza, sandwich and smoothies outlets rank third and are followed by sit-down restaurants and finally, cafeterias.

Table 38: Summary of convenience indices by type of outlet

Type of Outlet	# of Outlets[1]	Hours of Operation[2]	Wait times[3]	Final Rank
Asian outlets	3	5	4	3
Burger outlets	5	2	2	2
Cafeterias	2	7	7	5
Coffee outlets	2	1	3	1
Pizza outlets	3	4	5	3
Sandwich outlets	1	5	6	3
Sit-down restaurants	4	3	8	4
Smoothies outlets	5	6	1	3

[1] See table 7 for raw data
[2] See table 8 for raw data
[3] See table 21 for raw data

4.6.2 Cost/Value

Types of outlets were ranked in three measures related to cost/value (super-size options, energy cost and energy density) to determine the value of visiting each type of outlet. Outlets were ranked such that situations in which more value for the dollar (e.g. more super-size options, lower mean energy cost, higher mean

energy density) were ranked before lower value situations. According to the ranking system, burger outlets provide the greatest value per dollar, followed by coffee outlets and pizza outlets. Asian outlets and sit-down restaurants rank fourth and are followed by sandwich outlets, cafeterias and smoothies outlets.

Table 39: Summary of cost/value indices by type of outlet

Type of Outlet	Super-size option available[1]	Energy Cost[2]	Energy Density[3]	Final Rank
Asian outlets	2	4	7	4
Burger outlets	1	2	2	1
Cafeterias	4	8	6	6
Coffee outlets	4	1	1	2
Pizza outlets	4	3	3	3
Sandwich outlets	3	6	5	5
Sit-down restaurants	4	5	4	4
Smoothies outlets	4	7	8	7

[1] See section 4.5.1.2
[2] See table 30
[3] See table 29

4.6.3 Health

Types of outlets were ranked in five measures related to health (proportion of healthy food options available, healthier preparation options, specific healthy item availability, health-related food labels and availability of nutrition information) to determine the "health" of visiting each type of outlet. Outlets were ranked such that the most healthy situations (e.g. the highest proportion of healthy food options available, a higher number of healthier preparation options, greater availability of specific items, more health-related labels, and greater availability of nutrition information) were ranked before less healthy situations. The

proportion of healthy main meal options, healthy snack and side options and healthy beverage options were averaged to determine the rank of outlets in the "Proportion of healthy food options" column. Based on the ranking system, sandwich outlets ranked first for health, followed by smoothies outlets, sit-down restaurants, cafeterias, coffee outlets, pizza outlets, Asian outlets and finally, burger outlets.

Table 40: Summary of health indices by type of outlet

Type of Outlet	Proportion of healthy food options[1]	Healthier preparation options[2]	Specific healthy item availability[3]	Health-related food labels[4]	Availability of nutrition information[5]	Final Rank
Asian outlets	3	4	7	4	5	7
Burger outlets	6	3	8	6	1	8
Cafeterias	2	2	4	5	6	4
Coffee outlets	4	4	6	1	4	5
Pizza outlets	5	4	5	2	3	6
Sandwich outlets	2	1	1	3	2	1
Sit-down restaurants	3	4	2	2	6	3
Smoothies outlets	1	4	3	2	3	2

[1] See table 23, 24 and 25
[2] See table 26
[3] See table 28
[4] See table 35
[5] See table 37

4.6.4 Advertising

Types of outlets were ranked according to two campus media publications (the student newspaper and the undergraduate handbook) to determine the exposure of each type of outlet. Data from the graduate handbook and the campus radio station were excluded from the ranking system because there were too few ads to

be meaningful. Outlets were ranked such that higher proportions of advertisements were ranked before lower proportions. Based on the ranking system, coffee outlets were advertised most. Sandwich outlets, sit-down restaurants and smoothies ranked second, and were followed by pizza outlets. Asian outlets, burger outlets and cafeterias ranked last.

Table 41: Summary of advertising indices by type of outlet

Type of Outlet	Gateway[1]	Undergraduate handbook[1]	Final Rank
Asian outlets	6	5	4
Burger outlets	6	5	4
Cafeterias	6	5	4
Coffee outlets	1	2	1
Pizza outlets	4	4	3
Sandwich outlets	2	4	2
Sit-down restaurants	5	1	2
Smoothies outlets	3	3	2

[1] See table 17
[2] See table 19

4.6.5 Food Promotion within Food Outlets

Types of outlets were ranked according to the three types of advertisements found within food outlets (unhealthy, healthy, and overeating advertisements) to determine the healthfulness of advertising within each type of outlet. Outlets were ranked such that the most healthful situations (e.g. the lowest proportion of unhealthy and overeating advertisements and the highest proportion of healthy advertisements) were ranked before less healthful situations. According to the ranking system, smoothies outlets' promotions were the most healthful, followed by sit-down restaurants, cafeterias, sandwich outlets and coffee outlets. Asian outlets and pizza outlets ranked sixth, and were followed by burger outlets, which

ranked last.

Table 42: Summary of food promotion indices by type of outlet

Type of Outlet	Unhealthy[1]	Healthy[1]	Overeating[1]	Final Rank
Asian outlets	8	3	6	6
Burger outlets	7	7	7	7
Cafeterias	5	2	2	3
Coffee outlets	3	5	3	5
Pizza outlets	6	6	5	6
Sandwich outlets	4	2	4	4
Sit-down restaurants	1	4	1	2
Smoothies outlets	2	1	1	1

[1] See table 34

4.6.6 Summary of Outlet Type Characteristics: Summary and Interpretation

Since each previous section of results ended with an in-depth discussion about the practical significance of the findings, the current discussion will be brief in order to avoid redundancy.

Burger outlets, coffee outlets and pizza outlets ranked in the top three for both convenience and value. These three outlets, however, are ranked in the bottom four for health and healthful food promotions within establishments. Sandwich outlets, sit-down restaurants, smoothies outlets and cafeterias, on the other hand, are ranked in the top four for health and healthful food promotions, but are ranked in the bottom four for convenience and value.

The four least healthy types of outlets (Asian outlets, burger outlets, coffee outlets and pizza outlets) comprise 40% of food outlets on University of Alberta campus.

The four healthiest types of outlets (sandwich outlets, sit-down restaurants, smoothies outlets and cafeterias) comprise 48% of food outlets on campus. As previously discussed, convenience stores, though not assessed for consumer nutrition environments, may be considered a "less healthy" type of outlet at which to purchase food. When convenience stores are added to the "least healthy" list of establishments, the proportion of least healthy outlets rises to 52%.

The University of Alberta campus has a roughly equal proportion of healthy and unhealthy food outlets. The range of outlet types and the range of foods and prices indicate that although it is possible to eat healthily on campus, it is not specifically encouraged by the food environment, and is often less convenient and more expensive to do so.

5 *Conclusions*

5.1 Main Conclusions

For ease of reference, the purpose and objectives are restated in the following sections.

5.1.1 Restatement of Purpose

Despite the increasing interest in the food environments and its impact on food choice, there have been relatively few conceptual frameworks and even fewer assessment tools published. The current study attempted to provide a comprehensive assessment method by which to evaluate food environments and to evaluate the food environment of the University of Alberta.

The current study used a recently published conceptual model of the food environment as well as existing literature to inform the development of a comprehensive method by which to assess the University of Alberta's food environment. The literature was searched for articles exploring influences on food choice. The influences on food choice of food affordability, food availability, food-related policies, food advertising and the availability of nutrition information were recurring themes in the food choice literature. Thus, the tools were developed with a strong theoretical and conceptual basis.

5.1.2 Restatement of Objectives

The objectives of the current study were as follows:

1) To describe the food environment of the University of Alberta.

2) To develop a series of tools that will adequately describe the food environment of the University of Alberta.

5.1.3 Development of Assessment Tools

The tools described in this study were developed through a literature review of the published literature, grey literature, and personal communication with other researchers who are also developing food environment assessment tools. Because there are few recognized assessment tools, those developed for the current study are comprehensive, fairly time intensive and would require significant resources should a broader food environment be evaluated. As the literature continues to grow and the strength of specific environmental influences on food choice is more fully ascertained, the assessment tools described in this study may be pared down to ensure that only the strongest influences are being assessed.

One factor affecting the resource intensity of conducting a comprehensive assessment of the food environment, of course, is the size of the environment. Choosing University of Alberta as the setting for the implementation of the newly-developed tools was beneficial in that it was large enough to provide adequate data to conduct statistical tests. On the other hand, it was a small enough setting that one researcher could carry out the data collection in a reasonable amount of time.

5.2 General Conclusions

Somewhat intuitively, the outlets that ranked lowest in terms of health and desirable advertising (i.e. those advertising healthy foods more frequently) tended to rank highest in terms of convenience and value. These findings confirm the results of other, similar studies (Carter & Swinburn, 2004).

The two documents examined as part of the organizational nutrition environment (i.e. the Students' Union General Survey and the Senate Task Force on Wellness report) give credence to the importance of supporting health. Despite this, the policy and consumer nutrition environment findings did not reflect the policy changes implicated in the two documents. Specifically, despite the students' dissatisfaction with the campus food environment and the Board or Governors approving the recommendations for healthier food options on campus, there were neither healthy public food policies nor any attempts being made on behalf of the three governing bodies to improve the food environment. The discrepancy between the two documents' findings and recommendations represents an opportunity to improve the food environment. As a researcher in health promotion, my responsibility is to inform the governing bodies of this discrepancy and offer suggestions for improvement. This also represents a potential opportunity for research into organizational change.

As French et al. (1997) suggest, adolescents can be encouraged to choose

healthier foods by reducing the prices of healthy foods. In the current study, students themselves have been vocal about wanting more healthy foods at a reduced cost. Wechsler et al. (2000) point out that in order to 'sell' the idea of lowering the price of healthy foods to decision makers, advocates must offer suggestions for how to avoid revenue loss. The current study is a concrete example of why decision makers must be presented with opportunities to increase the amount of reasonably-priced healthy foods without losing revenue. As previously mentioned, decision-makers from each of the three main governing bodies spoke of the importance of focusing on the food provision service they offered as a business. Each of them appealed to the notion that the generally low sales of salads, fresh fruit and vegetables evidenced the fact that students wanted to eat poorly. They did not consider that the mean energy cost of salads on campus was $3.11/100kcal compared to $0.82/100kcal for burgers and $0.44/100kcal for French fries and that many students are on a tight budget. The Vice President of the Students' Union in charge of student life was questioned whether he thought that charging an extra $1.50 to $2.00 for a salad instead of French fries at the two Students' Union-owned campus pubs would have an effect on students' choice, particularly for the students who would prefer to have salad. He answered that students want to be able to make poor food decisions at the campus pubs and that the extra cost for a salad would not have a large impact. Instead, he pointed to the large quantities of leftover salad that was wasted everyday as evidence that students did not want to eat salad. This fact was also used to justify the additional cost for salad. In other words, since salad does not

keep fresh as long as pre-cut French fries, much more salad than French fries is wasted at the end of the business day. Therefore, he said, the pubs had to charge more for salad to recoup the costs of all the waste. According to his position about students wanting to eat less healthy foods, he responded negatively when asked whether lowering the cost of the salads would encourage students to choose salad more often, thereby reducing the cost due to waste.

5.3 Limitations

5.3.1 Setting

First, as previously mentioned, the University of Alberta provided an ideal setting in which to first test the assessment tools because it was large enough to provide adequate data to conduct statistical tests and yet was small enough that one researcher could carry out the data collection in a reasonable amount of time. Despite this, the information environment, in particular, proved difficult to comprehensively assess. Although the campus newspaper, the campus radio station and the undergraduate and graduate handbooks were assessed, people within the University of Alberta community are exposed to many more media channels throughout the day. For example, people are regularly exposed to food-related information and advertising through television, radio, the internet, and print. Evaluating the information environment in a larger environment would be a much more time and resource intensive undertaking. Even with a large study aiming to assess a larger environment, it would be beyond the scope of any study to evaluate all potential sources of food information and food advertising. This

will be an important consideration for future studies looking at the impact of advertising on food choice.

Second, the current study only evaluated the "formal" university environment (i.e. only publicly accessible outlets were evaluated). In so doing, an important source of food may have been overlooked. For example, if it is customary for a particular department to bring in snacks or treats on a given day of the week, food choices of employees and/or students within the department may be influenced. Alternatively, student or staff lunchrooms may provide a potential positive food environment that enables students and/or staff to avoid dependence on food outlets on campus. In other words, students and/or staff who are limited by time, cost, or health concerns but who have access to a lunchroom may choose to bring food from home and thus may represent a segment of the University of Alberta community whose food choices are not as influenced by the food environment. Assessing this aspect of the organizational nutrition environment may have been a worthwhile endeavor had time and resources permitted. Indeed, the question of whether or not people who use lunchrooms represent a more health-conscious segment of the population may be useful to inform interventions targeting the improvement of the food environment.

Third, the University of Alberta campus is home to hundreds of students. Assessing the home environments of students, however, was also beyond the scope of the current study. Since post-secondary students are often in situations of

transient poverty, they may be more reliant on their immediate environment for food. Thus, although assessing the home environment may have been impossible for the current study, assessing the community and consumer nutrition environments at the University of Alberta may provide insight into the home environments of University residents.

Finally, because of the geographical boundaries in the current study (i.e. only food outlets on campus were assessed), the study failed to assess any local grocery stores as a source of basic ingredients and fresh foods. A recent project undertaken by University of Alberta researchers involved assessing the "foodscapes" of several areas in Edmonton, Alberta. The FoodScapes project was a multi-year, interdisciplinary project that aimed to "identify and explore market and policy forces and local and neighborhood factors influencing the distribution, accessibility, and local context of food retail outlets and advertising within the city of Edmonton" (Tomic, 2003, p. 1). The second phase of the study, charting Edmonton's foodscapes, assessed aspects of food establishments and the food environment. One of the six foodscapes that was explored in detail was called the "University U." The "University U" had different geographical boundaries, though the east border of the "University U" overlapped with the west border of the current study. The FoodScapes project identified only one grocery store in the University U area, which was situated three city blocks west of the western border of the University of Alberta campus. This finding indicates that access to basic ingredients and fresh foods may be low in this area.

5.4 Future Directions

5.4.1 Measures

The summary and interpretations sections at the end of each results section provide a preliminary assessment of the usefulness of each of the assessment tools. Future studies should examine how measures of food availability, in particular, and all measures of the food environment, in general, relate to one another using measures of reliability. In addition, as the food environment literature progresses, it will be necessary to refine and perhaps omit some of the tools, depending on their construct validity (i.e. whether particular tools adequately measure what they purport to measure). In a field where there are very few assessment tools in use, it is difficult to accurately assess the construct validity of the tools. Since the development of the tools described in the current study was heavily informed by the current literature, construct validity should be high. Given the theoretical basis of the tools, they should be changed as the literature and food-environment theory changes.

5.4.2 Implications for Future Research

Relatively little is known about food environments and even less is known about how the food environment interacts with individual agency to determine food choice. Therefore, small-scale studies comparing the food environment with diets of residents will be helpful in determining those aspects of the food environment that are particularly predictive of food choice. Once more is known about how and which aspects of a food environment predict food choice, this comprehensive,

time and resource intensive method may be pared down in order to evaluate only those aspects of the environment deemed most predictive of nutrition behavior.

In the meantime, health promotion practitioners and interested members of the community should work to improve the food environment, especially in terms of increasing the availability of healthy foods and ensuring that they are provided at a reasonable price. A healthy food environment would encourage healthy food choices, which would in turn impact long-term health. Some of the challenges to improving the food environment discussed in section 1.5 have already been addressed in the current study (see sections 4.2.3 and 4.3.5 for suggestions on how to improve the food environment at the University of Alberta). For example, as described, both the upper echelons of university administration (the Board of Governors via the Senate Task Force on Wellness Report) and the student body (via the Students' Union General Survey) have voiced their desire for reasonably priced healthier foods. Healthy food advocates, like the President of the Lister Hall Students' Association and others on campus seem to be working in silos, unaware of each other and also unaware of techniques and strategies that could be used to mobilize other students and staff to advocate for change. Given the already voiced support for improving the food environment, it is likely that a few advocates working in an organized fashion would be able to effect positive change on the University of Alberta campus. On a broader scale, it is imperative to bring together health professionals, researchers from a variety of disciplines, agricultural and food industries, government, advocacy groups, and educators to

undertake the enormous task of changing the food environment (Booth et al., 2001; Hill, 1998; Lytle & Fulkerson, 2002).

References

Alston, J.M., Sumner, D.A. & Vosti, S.A. (2006). Are Agricultural Policies Making Us Fat? Likely Links between Agricultural Policies and Human Nutirtion and Obesity, and Their Policy Implications. *Review of Agricultural Economics 28*(3), 313 - 322.

Altman, D.G., Levine, D.W., Coeytaux, R., Slade, J., Jaffe, R.. (1996). Tobacco promotion and susceptibility to tobacco use among adolescents aged 12 through 17 years in a nationally representative sample. *American Journal of Public Health, 86*, 1590-1593.

Anding, J. D., Suminski, R. R., & Boss, L. (2001). Dietary intake, body mass index, exercise, and alcohol: Are college women following the dietary guidelines for Americans? *Journal of American College Health, 49*(4), 167-171.

Bakan, J. (2004). *The Corporation: the pathological pursuit of profit and power*. Toronto: Penguin Canada.

Bauer, K. W., Yang, Y. W., & Austin, S. B. (2004). "How can we stay healthy when you're throwing all of this in front of us?" findings from focus groups and interviews in middle schools on environmental influences on nutrition and physical activity.[see comment]. *Health Education & Behavior, 31*(1), 34-46.

Biener, L. & Siegel, M. (2000). Tobacco marketing and adolescent smoking: more support for a causal inference. *American Journal of Public Health, 90,* 407-411.

Birmingham, C. L., Muller, J. L., Palepu, A., Spinelli, J. J., & Anis, A. H. (1999). The cost of obesity in canada. *Canadian Medical Association Journal, 160*(4), 483-488.

Block, J. P., Scribner, R. A., & DeSalvo, K. B. (2004). Fast food, race/ethnicity, and income: A geographic analysis. *American Journal of Preventive Medicine, 27*(3), 211-217.

Booth, S. L., Sallis, J. F., Ritenbaugh, C., Hill, J. O., Birch, L. L., & Frank, L. D. et al. (2001). Environmental and societal factors affect food choice and physical activity: Rationale, influences, and leverage points. [review] [31 refs]. *Nutrition Reviews, 59*(3 Pt 2), S21-39.

Brevard, P. B., & Ricketts, C. D. (1996). Residence of college students affects dietary intake, physical activity, and serum lipid levels. *Journal of the American Dietetic Association, 96*(1), 35-38.

Brownell, K.D., & Horgen, K.B. (2004). *Food Fight: the inside story of the food industry, America's obesity crisis, and what we can do about it.* Chicago: Contemporary Books.

Buscher, L. A., Martin, K. A., & Crocker, S. (2001). Point-of-purchase messages framed in terms of cost, convenience, taste, and energy improve healthful snack selection in a college foodservice setting.[see comment]. *Journal of the American Dietetic Association, 101*(8), 909-913.

Carter, M. A., & Swinburn, B. (2004). Measuring the 'obesogenic' food environment in new zealand primary schools. *Health Promotion International, 19*(1), 15-20.

Cheadle, A., Psaty, B. M., Curry, S., Wagner, E., Diehr, P., & Koepsell, T. et al. (1993). Can measures of the grocery store environment be used to track community-level dietary changes? *Preventive Medicine, 22*(3), 361-372.

Cheadle, A., Psaty, B. M., Curry, S., Wagner, E., Diehr, P., & Koepsell, T. et al. (1991). Community-level comparisons between the grocery store environment and individual dietary practices. *Preventive Medicine, 20*(2), 250-261.

Cousineau, T.M., Goldstein, M., Franko, D.L. (2004). A collaborative approach to nutrition education for college students. *Journal of the American College of Health, 53*(2), 72-84.

Crawford, R. (1979). Individual responsibility and health politics in the 1970s. In *Health Care in America: Essays in Social History*, S. Reverby & D. Rosner (eds.), Philadelphia, Temple University Press.

Cullen, K. W., Eagan, J., Baranowski, T., Owens, E., & de Moor, C. (2000). Effect of a la carte and snack bar foods at school on children's lunchtime intake of fruits and vegetables. *Journal of the American Dietetic Association, 100*(12), 1482-1486.

Darmon, N., Briend, A., & Drewnowski, A. (2004). Energy-dense diets are associated with lower diet costs: A community study of french adults. *Public Health Nutrition, 7*(1), 21-27.

Datline. (2006). Food Fight. Retrieved August 20, 2006, from http://www.msnbc.msn.com/id/14349691/

Drewnowski, A. (2004). Obesity and the food environment: Dietary energy density and diet costs. *American Journal of Preventive Medicine, 27*(3 Suppl), 154-162.

Drewnowski, A., & Darmon, N. (2005a). The economics of obesity: Dietary energy density and energy cost. [review] [110 refs]. *American Journal of Clinical Nutrition, 82*(1 Suppl), 265S-273S.

Drewnowski, A., & Darmon, N. (2005b). Food choices and diet costs: An economic analysis. *Journal of Nutrition, 135*(4), 900-904.

Drewnowski, A., & Levine, A. S. (2003). Sugar and fat--from genes to culture. [review] [7 refs]. *Journal of Nutrition, 133*(3), 829S-830S.

Drewnowski, A., & Rolls, B. J. (2005). How to modify the food environment. *Journal of Nutrition, 135*(4), 898-899.

Economist. (2005). Fast foods' yummy secret. *The Economist, (27 August)*, 60-62.

Engell, D., Bordi, P., Borja, M., Lambert, C., & Rolls, B. (1998). Effects of information about fat content on food preferences in pre-adolescent children. *Appetite, 30*(3), 269-282.

Evans, W.D., Renaud, J.M., Finkelstein, E., Kamerow, D.B., Brown, D.S. (2006). Changing perceptions of the childhood obesity epidemic. *American Journal of Health Behavior, 30*(2), 167-176.

Fedio, C. (2006). Food fight still rages over Aramark contract. *The Gateway, XCVII*(summer 3), 1-2.

French, S. A. (2003). Pricing effects on food choices. [review] [22 refs]. *Journal of Nutrition, 133*(3), 841S-843S.

French, S. A., Jeffery, R. W., Story, M., Breitlow, K. K., Baxter, J. S., & Hannan, P. et al. (2001). Pricing and promotion effects on low-fat vending snack purchases: The CHIPS study. *American Journal of Public Health, 91*(1), 112-117.

French, S. A., Jeffery, R. W., Story, M., Hannan, P., & Snyder, M. P. (1997). A pricing strategy to promote low-fat snack choices through vending machines. *American Journal of Public Health, 87*(5), 849-851.

French, S. A., Story, M., & Fulkerson, J. A. (2002). School food policies and practices: A state-wide survey of secondary school principals. *Journal of the American Dietetic Association, 102*(12), 1785-1789.

French, S. A., Story, M., Fulkerson, J. A., & Gerlach, A. F. (2003). Food environment in secondary schools: A la carte, vending machines, and food policies and practices. *American Journal of Public Health, 93*(7), 1161-1167.

French, S. A., Story, M., & Jeffery, R. W. (2001). Environmental influences on eating and physical activity. [review] [100 refs]. *Annual Review of Public Health, 22*, 309-335.

French, S. A., Story, M., Jeffery, R. W., Snyder, P., Eisenberg, M., & Sidebottom, A. et al. (1997). Pricing strategy to promote fruit and vegetable purchase in high school cafeterias. *Journal of the American Dietetic Association, 97*(9), 1008-1010.

French, S. A., & Wechsler, H. (2004). School-based research and initiatives: Fruit and vegetable environment, policy, and pricing workshop. [review] [30 refs]. *Preventive Medicine, 39*(Suppl 2), S101-7.

Fried, E. J., & Nestle, M. (2002). The growing political movement against soft drinks in schools (commentary). *Journal of the American Medical Association, 288*, 2181-266.

Gallo, A. E. (1999). Food advertising in the United States. In E. Frazao (Ed.), *America's eating habits: Changes and consequences.* (pp. Agriculture Information Bulletin Number 750). Washington, DC: US Department of Agriculture.

Georgiou, C. C., Betts, N. M., Hoerr, S. L., Keim, K., Peters, P. K., & Stewart, B. et al. (1997). Among young adults, college students and graduates practiced more healthful habits and made more healthful food choices than did nonstudents. *Journal of the American Dietetic Association, 97*(7), 754-759.

Glanz, K., Basil, M., Maibach, E., Goldberg, J., & Snyder, D. (1998). Why americans eat what they do: Taste, nutrition, cost, convenience, and weight control concerns as influences on food consumption. *Journal of the American Dietetic Association, 98*(10), 1118-1126.

Glanz, K., Sallis, J. F., Saelens, B. E., & Frank, L. D. (2005). Healthy nutrition environments: Concepts and measures. [review] [56 refs]. *American Journal of Health Promotion, 19*(5), 330-333.

Haberman, S., & Luffey, D. (1998a). Weighing in college students' diet and exercise behaviors. *Journal of American College Health, 46*, 189-191.

Haberman, S., & Luffey, D. (1998b). Weighing in college students' diet and exercise behaviors. *Journal of American College Health, 46*, 189-191.

Hannan, P., French, S. A., Story, M., & Fulkerson, J. A. (2002). A pricing strategy to promote sales of lower fat foods in high school cafeterias: Acceptability and sensitivity analysis. *American Journal of Health Promotion, 17*(1), 1-6.

Harnack, L. J., Jeffery, R. W., & Boutelle, K. N. (2000). Temporal trends in energy intake in the united states: An ecologic perspective. *American Journal of Clinical Nutrition, 71*(6), 1478-1484.

Hastings, G.B., Stead, M., McDermott, L., Forsyth, A., MacKintosh, A.M., & Rayner, M. (2003). Review of Research on the Effects of Food Promotion to Children - Final Report and Appendices. Prepared for the Food Standards Agency. Retrieved June 27, 2006 from http://www.ism.stir.ac.uk/pdf_docs/final_report_19_9.pdf

Hertzler, A. A., & Frary, R. B. (1989). Food behavior of college students. *Adolescence, 24*(94), 349-356.

Higginson, C.S., Kirk, T.R., Rayner, M.J., & Draper, S. (2002a). How do consumers use nutrition label information? *Nutrition & Food Science, 32*(4), 145-152.

Higginson, C.S., Rayner, M.J., Draper, S., & Kirk, T.R. (2002b). The nutrition label – which information is looked at? *Nutrition & Food Science, 32*(3), 92-99.

Hill, J. O. (1998). Genetic and environmental contributions to obesity.[comment]. *American Journal of Clinical Nutrition, 68*(5), 991-992.

Hill, J. O., & Peters, J. C. (1998). Environmental contributions to the obesity epidemic. [review] [20 refs]. *Science, 280*(5368), 1371-1374.

Huang, T. T., Harris, K. J., Lee, R. E., Nazir, N., Born, W., & Kaur, H. (2003). Assessing overweight, obesity, diet, and physical activity in college students. *Journal of American College Health, 52*(2), 83-86.

Institute of Medicine. (2005). Food marketing to children: threat or opportunity? Retrieved, August 17, 2006, from http://www.nap.edu/catalog/11514.html#toc

Jeffery, R. W., French, S. A., Raether, C., & Baxter, J. E. (1994). An environmental intervention to increase fruit and salad purchases in a cafeteria. *Preventive Medicine, 23*(6), 788-792.

Kant, A. K. (2000). Consumption of energy-dense, nutrient-poor foods by adult Americans: Nutritional and health implications. the third national health and nutrition examination survey, 1988–1994. *American Journal of Clinical Nutrition, 72*, 929-936.

Katzmarzyk, ,P.T., & Ardern, ,C.I. (2004). Overweight and obesity mortality trends in Canada,

1985-2000. Canadian Journal of Public Health, 95(1), 16-20.

Katzmarzyk, P. T., & Janssen, I. (2004). The economic costs associated with physical inactivity and obesity in canada: An update. *Canadian Journal of Applied Physiology, 29*, 90-115.

Kelder, S. H., Perry, C. L., Klepp, K. I., & Lytle, L. L. (1994). Longitudinal tracking of adolescent smoking, physical activity, and food choice behaviors. *American Journal of Public Health, 84*(7), 1121-1126.

Krippendorf, K. (2004). *Content Analysis: An Introduction to Its Methodology.* 2nd edition, Thousand Oaks, CA: Sage.

Krukowski, R.A., Harvey-Berino, J., Kolodinsky J., Narsana, R.T., & DeSisto, T.P. (2006). Consumers may not use or understand calorie labeling in restaurants. *Journal of the American Dietetic Association, 106*(6), 917-920.

Kubik, M. Y., Lytle, L. A., Hannan, P. J., Perry, C. L., & Story, M. (2003). The association of the school food environment with dietary behaviors of young adolescents. *American Journal of Public Health, 93*(7), 1168-1173.

Kubik, M. Y., Lytle, L. A., & Story, M. (2005). Soft drinks, candy, and fast food: What parents and teachers think about the middle school food environment. *Journal of the American Dietetic Association, 105*(2), 233-239.

Labonte, R. (1994). Death of a program: birth of a metaphor. In Rootman, I. (ed.) *Health Promotion in Canada: Provincial, National, and International Perspectives.* Saunders, Toronto.

Labonte, R. and Penfold, S. (1981). Canadian perspectives in health promotion: a critique. *Health Education, 19,* 4–9.

Lewis, L. B., Sloane, D. C., Nascimento, L. M., Diamant, A. L., Guinyard, J. J., & Yancey, A. K. et al. (2005). African americans' access to healthy food options in south los angeles restaurants. *American Journal of Public Health, 95*(4), 668-673.

Library of Parliament. (2005). *The canadian obesity epidemic.* Retrieved November 5, 2005 from http://www.parl.gc.ca/information/library/PRBpubs/prb0511-e.htm

Lin, B. H., Guthrie, J., & Frazao, E. (1999). Quality of children's diets at and away from home. *Food Review, 22*(1), 2-10.

Lobstein, T. (1998). The Common Agricultural Policy -- A Dietary Disaster? *Consumer Policy Review 8(*3), 82 - 87.

Lobstein, T. & Dibb, S. (2005). Evidence of a possible link between obesogenic food advertising and child overweight. *Obesity Reviews, 6*(3), 203-20.

Lowry, R., Galuska, D. A., Fulton, J. E., Wechsler, H., Kann, L., & Collins, J. L. (2000). Physical activity, food choice, and weight manage. *American Journal of Preventive Medicine, 18*(1), 18-27.

Lytle, L. A., Seifert, S., Greenstein, J., & McGovern, P. (2000). How do children's eating patterns and food choices change over time? results from a cohort study. *American Journal of Health Promotion, 14*, 222-228.

Lytle, L. A., & Fulkerson, J. A. (2002). Assessing the dietary environment: Examples from school-based nutrition interventions. *Public Health Nutrition, 5*(6A), 893-899.

Martins, Y., Pelchat, M.L., Pliner, P. (1997). 'Try it ; it's good for you' : effects of taste and nutrition information on willingness to try novel foods. *Appetite, 28*, 89-102.

Mayer, J., Dubbert, P. & Elder, J. (1989). Promoting nutrition at the point of choice: a review. *Health Education Quarterly, 16i, 31-43.*

McLeroy, K. R., Bibeau, D., Steckler, A., & Glanz, K. (1988). An ecological perspective on health promotion programs. *Health Education Quarterly, 15*(4), 351-377.

Michigan Department of Community Health. (2005). *Promoting healthy eating.* Retrieved November 10, 2005 from http://mihealthtools.org/neat/

Ministry of Education & Ministry of Health. (2005). Guidelines for food and beverage sales in B.C. Schools. Retrieved August 17, 2006, from http://www.bced.gov.bc.ca/health/guidelines_sales.pdf

Morland, K., Wing, S., & Diez Roux, A. (2002). The contextual effect of the local food environment on residents' diets: The atherosclerosis risk in communities study.[see comment]. *American Journal of Public Health, 92*(11), 1761-1767.

Morland, K., Wing, S., Diez Roux, A., & Poole, C. (2002). Neighborhood characteristics associated with the location of food stores and food service places. *American Journal of Preventive Medicine, 22*(1), 23-29.

Morton, J. F., & Guthrie, J. F. (1998). Changes in children's total fat intakes and their food group sources of fat 1989-91 versus 1994-95: Implications for diet quality. *Family Economics and Nutrition Review, 11*(3), 44-57.

Nestle, M. (2002). *Food politics: How the food industry influences nutrition and health*. Los Angeles: University of California Press.

Nestle, M. (2000a). Changing the diet of a nation: Population/regulatory strategies for a developed economy. *Asia Pacific Journal of Clinical Nutrition, 9*, S33-S40.

Nestle, M. (2000b). Ethical dilemmas in choosing a healthful diet: Vote with your fork!. [review] [89 refs]. *Proceedings of the Nutrition Society, 59*(4), 619-629.

Nestle, M. (2000c). Soft drink "pouring rights": marketing empty calories to children. *Public Health Reports, 115*, 308-319.

Nestle, M., Wing, R., Birch, L., DiSogra, L., Drewnowski, A., & Middleton, S. et al. (1998a). Behavioral and social influences on food choice. *Nutrition Reviews, 56*, S50-S64.

Nestle, M., Wing, R., Birch, L., DiSogra, L., Drewnowski, A., & Middleton, S. et al. (1998b). Behavioral and social influences on food choice. *Nutrition Reviews, 56*, S50-S64.

Nestle, M., & Jacobson, M. F. (2000). Halting the obesity epidemic: A public health policy approach. *Public Health Reports, 115*(1), 12-24.

Nielsen, S. J., & Popkin, B. M. (2003). Patterns and trends in food **portion** sizes,1977–1998. *Journal of the American Medical Association, 289*, 450-453.

O'Dougherty, M., Harnack, L.I., French, S.A., Story, M., Oaks, J.M. & Jeffery, R.W. (2006). Nutrition labeling and value size pricing at fastfood restaurants: a consumer perspective. *American Journal of Health Promotion, 20*(4), 247-250.

Oliver, J. E., & Lee, T. (2002). *Public opinion and the politics of america's obesity epidemic. KSG working paper no. RWP02-017.* Retrieved December 5, 2004 from http://ssrn.com/abstract=313824

Pierce, J.P., Choi, W.S., Gilpin, E.A., Farkas, A.J. & Berry, C.C. (1998). Tobacco industry promotion of cigarettes and adolescent smoking. *Journal of the American Medical Association, 279*, 511-515.

Racette, S. B., Deusinger, S. S., Strube, M. J., Highstein, G. R., & Deusinger, R. H. (2005). Weight changes, exercise, and dietary patterns during freshman and sophomore years of college. *Journal of American College Health, 53*(6), 245-251.

Raine, K. D. (2005). Determinants of healthy eating in canada: An overview and synthesis. [review] [61 refs]. *Canadian Journal of Public Health.Revue Canadienne De Sante Publique, 96*(Suppl 3:S8-14), JuAug.

Reidpath, D.D., Burns, C., Garrard, J., Mahoney, M., Townsend, M. (2002). An ecological study of the relationship between social and environmental determinants of obesity. *Health and Place. 8*, 141-145

Richter, K. P., Harris, K. J., Paine-Andrews, A., Fawcett, S. B., Schmid, T. L., & Lankenau, B. H. et al. (2000). Measuring the health environment for physical activity and nutrition among youth: A review of the literature and applications for community initiatives. *Preventive Medicine, 31*, S98-S111.

Roth, P. (2000). Undertaking qualitative research: concepts and cases in injury, health and social life. University of Alberta Press: Edmonton, Canada.

Sallis, J. F., & Owen, N. (2002). Ecological models of health behavior. In K. Glanz, B. K. Rimer & F. M. Lewis (Eds.), *Health behavior and health education* (pp. 462-484). San Fransisco: Wiley.

Schuette, L. K., Song, W. O., & Hoerr, S. L. (1996). Quantitative use of the food guide pyramid to evaluate dietary intake of college students. *Journal of the American Dietetic Association, 96*(5), 453-457.

Senate Task Force on Wellness. (2003). Becoming the healthiest university in Canada. Retrieved August 16, 2006 from, http://www.uofaweb.ualberta.ca/senate/nav03.cfm?nav03=16198&nav02=12501&nav01=12483

Seymour, J. D., Yaroch, A. L., Serdula, M., Blanck, H. M., & Khan, L. K. (2004). Impact of nutrition environmental interventions on point-of-purchase behavior in adults: A review. [review] [73 refs]. *Preventive Medicine, 39*(Suppl 2), S108-36.

Statistics Canada. (2005a). *Canadian community health survey: Obesity among children and adults.* Retrieved November 12, 2005 from http://www.statcan.ca/Daily/English/050706/d050706a.htm

Statistics Canada. (2005b). *Food consumption.* Retrieved November 6, 2005 from http://www.statcan.ca/Daily/English/051018/d051018e.htm

Statistics Canada (2005c). Canadian Community Health Survey, 2004. Retrieved August 2, 2006, from http://www.statcan.ca/english/research/82-620-MIE/2005001/tables.htm

Statistics Canada. (2005d). *University enrolment.* Retrieved November 5, 2005 from http://www.statcan.ca/Daily/English/051011/d051011b.htm

Story, M. & French, S. (2004) Food advertising and marketing directed at children and adolescents in the US. *International Journal of Behavioral Nutrition and Physical Activity 1,* 3.

Story, M., Neumark-Sztainer, D., & French, S. (2002). Individual and environmental influences on adolescent eating behaviors. [review] [100 refs]. *Journal of the American Dietetic Association, 102*(3 Suppl), S40-51.

Stewart, H., Blisard, N., Jolliffe, D., Bhuyan, S. (2005). The demand for food away from home: do other preferences compete with our desire to eat healthfully? *Journal of Agricultural and Resource Economics, 30*(3), 520-536.

Swinburn, B., Egger, G., & Raza, F. (1999). Dissecting obesogenic environments: The development and application of a framework for identifying and prioritizing environmental interventions for obesity. *Preventive Medicine, 29*(6 Pt 1), 563-570.

Taylor, J. P., Evers, S., & McKenna, M. (2005). Determinants of healthy eating in children and youth. [review] [136 refs]. *Canadian Journal of Public Health.Revue Canadienne De Sante Publique, 96*(Suppl 3:S20-6), JuAug.

Tomic, K.E. (2003). Public summary: charting the foodscape: dietary options and food imagery in Edmonton Communities. Proposal.

Travers, K. D. (1997). Reducing inequities through participatory research and community empowerment. *Health Education & Behavior, 24*(3), 344-356.

University of Alberta. (2005). Why the U of A? Retrieved December 13, 2005 from http://www.registrar.ualberta.ca/ro.cfm?id=10

Wechsler, H., Devereaux, R. S., Davis, M., & Collins, J. (2000). Using the school environment to promote physical activity and healthy eating. *Preventive Medicine, 31*, S121-S137.

Westcombe, A., & Wardle, J. (1997). Influence of relative fat content information on responses to three foods. *Appetite*, *28*, 49–62.

World Health Organization. (2003). Diet, nutrition and the prevention of chronic diseases. *WHO technical report series 916.*

Young, L., & Nestle, M. (2003). Expanding portion sizes in the U.S. marketplace: Implications for nutrition counseling. *Journal of the American Dietetic Association, 103*, 231-234.

Appendix A

Semi-Structured Interview Guide

1) Can you tell me a bit about how the food sales aspect of your organization works?

2) Are there food-related policies followed by Aramark [the food service organization]/the Students' Union/the University of Alberta?

   a. For example, are there policies that determine which foods are available (e.g. a certain percentage of foods sold on campus have to be from the fruits and vegetables food group, etc)?

      i. If not, how does Aramark/the Students' Union/the University of Alberta determine which foods will be served?

   b. For example, are there policies that determine the cost of specific foods sold by your organization?

      i. If not, how does Aramark/the Students' Union/the University of Alberta determine the cost of foods?

3) If there are food-related policies, may I have a copy?

Depending on the answers from question 1, follow-up questions were asked. For example, Aramark has a contract with the University of Alberta to provide mandatory meal plans to all residents of the largest undergraduate residence (Lister Centre). A Meal Plan Card must be purchased by students, who use it to buy foods from Aramark locations around campus (including several franchises on campus). The following were probes to the Marketing Program Manager of Aramark.

1) Are residents able to spend their Meal Plan Card balances outside of Lister Centre?

2) Are residents able to spend their UDINE card balances in Lister

Centre?

3) How is the UDine card different than just putting money on the One Card (the University of Alberta student card)?

4) Who takes ownership of the UDine card (i.e. is Aramark responsible for the card or is does the Students' Union take responsibility?)

5) Are other residents offered meal plans, or only Lister students?

6) How is Aramark connected to the franchises at which the UDine card can be used?

   a. Aramark's corporate website mentions a partnership with the corporate franchises – what type of partnership?

7) Do any vending machines on campus accept Meal Plan or UDine Cards?

Appendix B

Quick Reference For Items to Maximize
Guidelines for Food and Beverage Sales in BC
(2005, BC Ministries of Education and Health)

Food Group*	Criteria**	Examples of Choose Most and Choose Sometimes items***
Grains *Focus on whole grains*	Calories: less than 300 Fat: less than 10 g Saturated fat: 5 g or less Trans fat: less than 0.2 g Sodium: 450 mg or less Sugars: less than 16 g, and sugars are not the 1st ingredient Artificial Sweeteners: none Iron: more than 4%	Bread, buns, bagels, and tortillas Pancakes Crackers Pastas Cereals if not too sweet Rice, wild rice, unseasoned Small muffins Small bags of baked grain-based chips (corn, wheat, rice, popcorn) if not too salty
Vegetables & Fruit *Focus on lower sodium choices*	Fat: 10 g or less Trans fat: less than 0.2 g Sodium: less than 300 mg Sugars: are not the 1st ingredient in foods, no added sugars in juice Caffeine: less than 15 mg Artificial Sweeteners: allowed in foods, not allowed in juice	Fresh/frozen/canned/dried vegetables and fruit 100% Juice (fruit or vegetable) Fresh or jarred salsa Frozen pureed fruit bars French "fries" baked from fresh or frozen potatoes (not battered or coated) Small bags of baked potato or apple chips if not too salty or sweet
Milk & Milk Products *Focus on lower sugar choices*	Milk is 1st ingredient (fortified soy drinks exempt) Calories: less than 250 for milk foods, less than 400 for fluid milk Fat: 15 g or less for milk foods, less than 10 g/250 mL for fluid milk Trans fat: less than 0.4 g Sodium: less than 400 mg for milk foods, less than 600 for fluid milk Sugar: less than 36 g in 175 of milk foods, or 250 mL for fluid milk Calcium: more than 5% per 100 mg sodium Caffeine: less than 15 mg Artificial Sweeteners: allowed	Plain or lightly flavoured: -Milk (skim, 1%, 2%, whole) -Fortified soy drink Cheese (made from milk, not soy), unprocessed, 33% milk fat or less Yogurt, low fat or regular (watch sugar content) Pudding, low fat or regular (watch sugar content) Smoothies (milk, unsweetened frozen fruit) Decaffeinated lattes, optional 5-10 mL flavoured syrup
Meat & Alternatives *Focus on lower fat and lower sodium choices*	Calories: 400 or less (less than 300 for nuts and seeds) Fat: 16 g or less per 60 g portion (nuts and seeds exempt from the fat restriction) Saturated fat: less than 8 g Trans fat: less than 1 g Sodium: 600 mg (Nuts and seeds: less than 300 mg)	Roasted, baked, or stir fried: Lean meats, unprocessed (beef, bison, pork, lamb, venison, moose) Poultry, unprocessed (turkey, chicken, duck, goose) Fish, tuna, salmon (fresh or canned in water/broth) Eggs Meat/poultry/fish/egg salads with low fat dressing Plain jerky (unflavoured) Legumes (beans, lentils, split peas) including dal, falafel, veggie dogs/burgers Peanut butter, other nut butters Nuts and seeds, with little added salt or sugar
Mixed Entrees *Focus on lower fat, lower sodium choices with vegetables*	Calories: less than 700 Fat: less than 20 g fat Saturated fat: less than 10 g Trans fat: less than 1 g Sodium: less than 1000 mg Sugars: 24 g or less (see "Healthier Foods: How To Make Fun-Fast-Food Healthier For Students" for tips www.bced.gov.bc.ca/health)	Sandwiches and short subs Spaghetti with meat sauce, Chili Hamburgers Pizza Stir fries Sushi Burritos, soft tacos, falafel in pita Homemade soup
Other***	Nutrition Criteria vary, but include: Trans fat: less than 0.2 g Sugars: are not the 1st ingredient Caffeine: less than 15 mg Artificial sweeteners: none	Plain water Decaffeinated tea/coffee Small portions of condiments

*Food groupings in the Guidelines are more specific
**This is a summary of the criteria for Choose Sometimes and Choose Most items. For exact criteria, please refer to the Guidelines
***Specific products will vary. Check the Nutrition Facts table and ingredient list of specific products to ensure they meet the criteria described in the Guidelines.

Appendix C

Guidelines For Food and Beverage Sales In BC Schools
Nutrition Criteria for Each Food Grouping

	Not Recommended	Choose Least	Choose Sometimes ✓	Choose Most ✓✓
Food Grouping: **Grains** Grains must be the first or second ingredient (not counting water) Grain ingredients may include: - flours made from wheat, rye, rice, potato, soy, millet, etc. - rice, pasta, amaranth, corn, quinoa, etc.	Some seasoned breads, commercial pancakes, biscuits, etc. Very high fat/sugary/salty baked goods like some crackers, muffins, cakes, cookies, squares, doughnuts, pastries, danishes, croissants – especially if big Most seasoned noodle mixes Most seasoned rice mixes Some sugary cereals Most salties grain and corn snacks, baked or fried (cereal mix, wheat chips, tortilla chips, popcorn, cheesies, etc.)	Medium sized baked items like some crackers, muffins, cakes, cookies, squares, doughnuts, pastries, danishes, croissants Some instant noodles (not enriched or containing fats) Some seasoned rice mixes Some sugary cereals Some fried grain and corn snacks (cereal mix, wheat chips, tortilla chips, popcorn, cheesies, etc)	Many enriched breads, buns, bagels, tortillas, English muffins, pancakes, etc Some small baked items such as sliced loaves or muffins, cookies, crackers Most pastas (including those with added egg, spinach or tomato) Most pasta salads Other rice, rice noodles and wraps Most cereals Some small bags of fried grain and corn snacks (cereal mix, wheat chips, tortilla chips, popcorn, cheesies, etc)	Many whole grain breads, buns, bagels, tortillas, English muffins, pancakes, etc Some small baked items with whole grains, fibre, fruit or nuts, such as sliced loaves or muffins, cookies, crackers Most whole grain pastas Brown/wild rice Some whole grain cereals, cereals with fibre, fruit or nuts Some small bags of baked whole grain and corn snacks (cereal mix, wheat chips, tortilla chips, popcorn, etc)
Nutrition Criteria	**ANY of the following:** Calories: more than 400 Fat: 15 g or more Saturated fat: more than 5 g Trans fat: 0.2 g or more Sodium: more than 480 mg Sugars: more than 28 g Sugars: are 1st ingredient AND there is less than 2% iron (0.28 mg)	**ANY of the following:** Calories: 300-400 Fat: 10-15g Sugars: 16-28 g Iron: less than 4 % (0.56 mg) Sugars: are 1st ingredient AND there is 2-20% iron (0.28-2.8 mg)	**ANY item with:** Fat: less than 10 g Sugars: may be 1st ingredient IF there is more than 20% iron (2.8 mg) AND any item that passes the Least and Not Recommended, but does not pass the Most criteria May be artificially sweetened	**ANY item that:** passes the Not Recommended, Least, and Sometimes criteria AND has Fibre: 2 g or more

Foods high in starches and sugars (natural or added) can leave particles clinging to teeth and put dental health at risk. Grain choices of particular concern include some cereals, granola bars, crackers, cookies and chips (corn, wheat, rice, etc). The BC Dental Public Health Committee suggests eating these clingy foods only at mealtimes, and choosing at snack time grain choices that clear quickly from the mouth. For more information on how food and beverage choices can affect dental health, see www.bcpsd.gov.bc.ca/health

Guidelines For Food and Beverage Sales In BC Schools
Nutrition Criteria for Each Food Grouping

	Not Recommended	Choose Least	Choose Sometimes ✓	Choose Most ✓✓
Food Grouping: **Vegetables & Fruit** A vegetable or fruit must be the first or second ingredient, not counting water	Pickles (see Condiments & Add-ins Food Grouping) Fries: if moderately salted, or medium/large size, or if fried in fat containing trans fat Most candy and chocolate coated fruit Most potato/vegetable chips, some fruit chips (baked or fried), especially salted flavours	Some canned vegetables including regular sauerkraut Fries: small portions of deep fried potatoes, may be lightly salted Coated/breaded & deep fried vegetables Some jarred salsa (sodium) Some fruit gummies with pureed fruit as 1st ingredient Some bags of fruit chips Many small bags of potato/vegetable chips, salted (baked or fried)	Most fresh/frozen/dried vegetables & fruit, raw, cooked, moderately seasoned/dressed Most canned vegetables in broth, including low sodium sauerkraut Fruit canned in light syrup Fries: baked frozen fries (without trans fats), may be lightly salted Vegetables, breaded and baked Avocado – ¼ to 1/3 Some jarred salsa Some small bags of fruit chips Some very small bags of potato/vegetable chips, very lightly salted (baked or fried)	Most fresh/frozen/dried vegetables & fruit, raw, cooked, lightly seasoned/dressed Canned vegetables or fruits (in water, juice) Fries: baked fresh potato wedges or slices, may be tossed in oil Fresh salsa, some jarred salsas Some frozen fruit bars made with pureed fruit Some small bags of fruit chips or unsalted potato/vegetable chips (usually baked)
Nutrition Criteria	**ANY of the following:** Fat: 15 g or more Trans fat: 0.2 g or more Sodium: more than 600 mg Sugars: are 1st ingredient	**ANY of the following:** Fat: between 10-15 g Sodium: between 300-600 mg Sugars: both the 2nd & 3rd ingredients are sugars	**ANY of the following:** Fat: 5 - 10 g Sodium: less than 300 mg Sugars: are 2nd ingredient AND any item that passes the Least and Not Recommended, but does not pass the Most criteria May be artificially sweetened	**ANY item that:** passes the Not Recommended, Least, and Sometimes criteria AND has ALL of the following: Fat: 5g fat or less, and Sodium: less than 150 mg

Foods high in sugars and starches can leave particles clinging to teeth and put dental health at risk. Vegetable/fruit choices of particular concern include fruit leathers, dried fruit, and chips (potato or other). The BC Dental Public Health Committee suggests eating these clingy foods only at mealtimes, and choosing at snack time foods that clear quickly from the mouth, such as fresh/canned/frozen vegetables or fruit (raw or cooked). For more on how food and beverage choices can affect dental health, see www.bcpsd.gov.bc.ca/health

Guidelines For Food and Beverage Sales In BC Schools
Nutrition Criteria for Each Food Grouping

	Not Recommended	Choose Least	Choose Sometimes ✓	Choose Most ✓✓
Food Grouping: **Vegetable & Fruit Juices** A vegetable or fruit juice or puree must be the 1st ingredient, not counting water, and make up more than 50% of the volume	Most "drinks", "blends" "cocktails", and "beverages" Most fruit smoothies made with any Not Recommended ingredients Slush drinks and frozen treats with added sugars (see "Candies, Chocolates, etc" food grouping)	Some nectars or juice blends Seasoned vegetable juice 100% juice fortified with multivitamin/minerals Most fruit smoothies made with any Choose Least ingredients Slush drinks and frozen treats with concentrated juice	100% juice (fruit, low sodium vegetable, or combination) 100% juice fortified with only calcium AND/OR vitamin C Most fruit smoothies made with any Choose Sometimes ingredients Slush drinks and frozen treats made with Choose Sometimes items	
Nutrition Criteria	**ANY of the following:** Juice content: less than 50% Size: more than 600 mL Trans fat: 0.2 g or more Sodium: more than 600 mg Caffeine: 25 mg or more	**ANY of the following:** Juice content: between 51-99% OR juice is concentrated for slushies 100% juices fortified with more than vitamin C and/or calcium Fat: more than 5 g Sodium: 400-600 mg May be artificially sweetened Caffeine: more than 15 mg and less than 25 mg	**ANY of the following:** 100% juice, no added sugars or sweeteners (may be diluted with water), may be fortified with Vitamin C AND/OR calcium	NO criteria.

Many health professionals are concerned about excess consumption of sugars (natural and/or added) in juice, drinks and frozen treats.
The BC Community Nutritionists Council School Food Advisory Committee suggests that portion sizes of these be limited to:

- 250 mL or less for elementary schools
- 360 mL or less for middle/secondary schools

The BC Dental Public Health Committee recommends choosing plain water more often than juice. 100% juice and other fruit drinks contain sugars and acids (natural or added) that dissolve tooth enamel when sipped frequently. To avoid prolonged exposure to these sugars and acids, they suggest that only plain water be allowed in classrooms except at designated eating times. For more information on how food and beverage choices can affect dental health, see www.bcdcd.gov.bc.ca/health/

Guidelines For Food and Beverage Sales In BC Schools
Nutrition Criteria for Each Food Grouping

	Not Recommended	Choose Least	Choose Sometimes ✓	Choose Most ✓✓
Food Grouping: **Milk-based Foods** Milk must be the first or second ingredient; cream is NOT considered a milk ingredient	Most cream cheese & light cream cheeses & spreads (see "Condiments & Add-ins" food grouping for more information) Some candy flavoured ice creams & frozen yogurt Frozen 'yogurt' not based on milk ingredients (see "Candies, Chocolates, etc" food grouping) Most regular sized sundaes	Some higher fat cheeses Some processed cheese slices & spreads Some puddings/custards, etc. Most candy flavoured or rich ice creams & frozen yogurts	Some sweet yogurts Yogurt with artificial sweeteners Many puddings/custards, etc. including those with artificial sweeteners. Small portions of some ice creams & frozen yogurts – simply-flavoured (vanilla, chocolate and strawberry)	Most regular and light cheeses, cheese strings Some processed cheese slices Most yogurt, plain or simply-flavoured Some puddings/custards, etc Small portions of some ice cream & frozen yogurts – simply-flavoured (vanilla, chocolate and strawberry)
Nutrition Criteria	**ANY of the following:** Calories: more than 400 Fat: 20g or more Trans fat: 0.4 g or more, per 5 g of protein Sodium: more than 600 mg Sugars: are the 1st ingredient Calcium: less than 4 % (44 mg) Caffeine: 25 mg or more	**ANY of the following:** Calories: 250 - 400 Fat: 15 - 20 g Sodium: 400 - 600 mg Sugars: 36 g or more per 175 mL Calcium: 6% or less for every 100 mg sodium Caffeine: more than 15 mg and less than 25 mg	**ALL of the following:** 1st ingredient must be a milk ingredient (excluding cream) Sugars: Between 20-36 g per 175 mL AND any item that passes the Least and Not Recommended, but does not pass the Most criteria May be artificially sweetened	**ANY item that passes the Not Recommended, Least, and Sometimes criteria.** **AND** 1st ingredient must be a milk ingredient (excluding cream) Sugars: 20g or less per 175 mL

Guidelines For Food and Beverage Sales In BC Schools
Nutrition Criteria for Each Food Grouping

	Not Recommended	Choose Least	Choose Sometimes ✓	Choose Most ✓✓
Food Grouping: **Milk-based Beverages** Milk must be the first or second ingredient Fortified soy drinks contain protein and calcium and may be assessed in this food grouping. See "Other Beverages" for other fortified drinks (e.g. rice, potato based) and non-fortified soy drinks)	Many milks containing coffee products or other caffeine ingredients, especially larger portions Some regular eggnogs Some hot chocolate mixes made with water (See "Other Beverages")	Most candy flavoured milks Some milks containing tea products (eg. Chai) Smoothies made with Choose Least ingredients	Some flavoured fortified soy drinks Most basic flavoured milks Yogurt drinks Many small milkshakes made with milk and ice-cream Smoothies made with Choose Sometimes ingredients Many regular egg nogs Most hot chocolates made with milk	Plain, unflavoured milk (skim, 1%, 2%, whole) and fortified soy drinks Many milks modified with fatty acids Decaffeinated tea/coffee/lattés Smoothies made with Choose Most ingredients Some 'lite' eggnogs Some hot chocolates made with milk
Nutrition Criteria	**ANY of the following:** Size: more than 600 mL Calories: more than 600 Fat: more than 15 g per 250 mL Trans Fat: more than 0.4 g per 250 mL Sodium: more than 600 mg Sugars: are the 1st ingredient Caffeine: 25 mg or more	**ANY of the following:** Calories: 400 - 600 Fat: 10 - 15 g per 250 mL Sugars: more than 36 g per 250 mL Caffeine: more than 15 mg and less than 25 mg	**ALL of the following:** 1st ingredient must be a milk ingredient (excluding cream) (Fortified soy drinks are exempt from this requirement) Sugars: Between 20-36 g per 250 mL AND any item that passes the Least and Not Recommended, but does not pass the Most criteria May be artificially sweetened	**ANY item that passes the Not Recommended, Least, and Sometimes criteria.** **AND** **ALL of the following:** 1st ingredient must be a milk ingredient (excluding cream) (Fortified soy drinks are exempt from this requirement) Sugars: 20 g or less per 250 mL

Large portions of milk beverages can affect a student's appetite for other healthy foods.
The BC Community Nutritionists Council School Food Advisory Committee suggests that portion sizes of milk and milk beverages be limited to:
- 250 mL or less for elementary schools
- 360 mL or less for middle/secondary schools

To avoid prolonged exposure to the added sugars found in sweetened milk beverages, the BC Dental Public Health Committee suggests that only plain water be allowed in classrooms except at designated eating times. For more information on how food and beverage choices can affect dental health, see www.foodsensefororalhealth

Guidelines For Food and Beverage Sales In BC Schools
Nutrition Criteria for Each Food Grouping

	Not Recommended	Choose Least	Choose Sometimes ✓	Choose Most ✓✓
Food Grouping: **Meat & Alternatives** A meat or meat alternative must be the first or second ingredient (excluding nuts and seeds) Meat and meat alternatives include: - beef, pork, poultry, fish - game meats - eggs - soybeans, legumes, tofu See the "Nuts & Seed Mixes or Bars" category for guidelines on these items	Many products deep fried in hydrogenated or partially hydrogenated oils or in shortening Some wieners with more filler than meat	Most cold cuts & deli meats – turkey 'loaf', pepperoni, bologna, salami Some seasoned chicken or tuna salads Some breaded and fried chicken/fish/meat Most regular wieners/sausages Fattier pepperoni/chicken sticks Most smokies/bratwurst	Some marinated poultry Some fish canned in oil Marbled or fatty meats Cold cuts (lean), ham Marbled or fatty game meats Some chicken or tuna salads Some breaded and baked chicken/fish/meat Some lean wieners, sausages Lean pepperoni/chicken sticks Jerky (lean, seasoned) Some egg salads Some refried beans	Chicken, turkey Fish, seafood, fresh or canned in water/broth Lean meat (beef, bison, pork, lamb) Lean game meats and birds (venison, moose, etc) Some chicken or tuna salads Some lean wieners Jerky (plain) Eggs and some egg salads Tofu Legumes (beans, lentils, peas) and most legume salads Dal Falafel Some refried beans
Nutrition Criteria	**ANY of the following:** Calories: more than 400 Fat: more than 20 g Saturated Fat: more than 10 g Trans Fat: 1 g or more Sodium: more than 800 mg Iron: less than 1%	**ANY of the following:** Fat: more than 16 g per 60 g portion Saturated Fat: 6 - 10 g Sodium: 600 - 800 mg Protein: 5 g or less	**ANY item with:** Fat: 12 - 16 g per 60 g portion Sodium: 400 - 600 mg AND any item that passes the Least and Not Recommended, but does not pass the Most criteria	**ANY item that passes the Not Recommended, Least, and Sometimes criteria.** AND ALL of the following: Fat: less than 12 g per 60 g portion Sodium: less than 400 mg

Guidelines For Food and Beverage Sales In BC Schools
Nutrition Criteria for Each Food Grouping

	Not Recommended	Choose Least	Choose Sometimes ✓	Choose Most ✓✓
Food Grouping: **Nuts & Seed Mixes or Bars** Peanuts, nuts or seeds must be the first or second ingredient	Most chocolate or 'yogurt' covered nuts	Other nut/seed bars and mixes (e.g. sesame snap bars)	Nuts/seed bars and mixes with nuts/seeds as the first ingredient, may contain candy, 'yogurt', or chocolate if sugars are not the second and third ingredients Some dessert tofus	Nut/Seed bars and mixes with nuts/seeds as first ingredient, and no candies or chocolate Peanut butter Other nut/seed butters, e.g. tahini
Nutrition Criteria	ANY of the following: Calories: more than 400 Trans fat: 0.2 g or more Sodium: more than 400 mg Sugars: are the 1st ingredient AND item has more than 250 calories	ANY of the following: Calories: 300 - 400 Sodium: 300 – 400 mg Sugars: are the 1st ingredient AND item has 250 or fewer calories	ANY item that passes the Least and Not Recommended, but does not pass the Most criteria Sugars: are the 2nd + 3rd ingredients May be artificially sweetened	ANY item that passes the Not Recommended, Least, and Sometimes criteria AND ALL of the following: Sodium: less than 200 mg Sugars: are neither the 1st nor 2nd ingredient

Nut and seed mixes or bars containing dried fruit, sugars, crackers or other sugars/starches (natural or added) can leave particles clinging to teeth and put dental health at risk. The BC Dental Public Health Committee suggests eating these clingy foods only at mealtimes, and choosing at snack time foods that clear quickly from the mouth, such as plain nut/seed choices (may be savoury seasoned).

For more information on how food and beverage choices can affect dental health, see www.foodgoodforyourteeth.com

Guidelines For Food and Beverage Sales In BC Schools
Nutrition Criteria for Each Food Grouping

	Not Recommended	Choose Least	Choose Sometimes ✓	Choose Most ✓✓
Food Grouping: **Mixed Entrée Foods**	Some pizzas, e.g. with double cheese Some pastry based pizza pockets Some meat pot pies Note: Some trans fats occur naturally in meats like beef, lamb, goat, deer, moose, elk, buffalo	Most sandwiches or short submarine sandwiches made with deli or processed meats Some pizzas, e.g. meat lovers Some personal size pan pizzas Some pastry based pizza pockets Some meat pot pies Some sausage/Vegetable Rolls Some pasta with a cream based sauce Many frozen entrees	Most sandwiches, short submarine sandwiches, and burgers made with lean roasted meats (turkey, chicken, beef), but few vegetables Some cheese or meat pizzas Some pizzas with ½ the amount of cheese Pizza bagels Baked pizza pockets, pizza pretzels Some meat pot pies Some sushi Pilaf (rice and meat) Some pasta with a milk based sauce Some curries with few vegetables Hard tacos with meat or bean filling Some frozen entrees	Most sandwiches, short submarine sandwiches, and burgers made with lean meats (turkey, chicken, beef) and plenty of vegetables – whole grain breads/buns are preferred Some pizzas with vegetables Most stir fries, stews Most sushi Pilaf (with vegetables) Most pasta with vegetable based sauce (may have meat) Chili, some curries Burritos (bean or meat) Soft tacos filled with Choose Most ingredients Falafel in pita with tomatoes & tzatziki Some frozen entrees
Nutrition Criteria	ANY of the following: Calories: more than 1,000 Fat: more than 30 g Saturated Fat: 12 g or more Trans Fat: more than 1 g Sodium: more than 1,400 mg Iron: less than 3%	ANY of the following: Calories: 700 - 1,000 Fat: 20 - 30 g Saturated Fat: 10 - 12 g Sodium: 1,000 - 1,400 mg Sugars: more than 24 g	ANY item that passes the Least and Not Recommended, but does not pass the Most criteria	ANY item that passes the Not Recommended, Least, and Sometimes criteria AND ingredients: contains vegetables or fruits within the first 3 ingredients (not counting water)

Guidelines For Food and Beverage Sales In BC Schools
Nutrition Criteria for Each Food Grouping

	Not Recommended	Choose Least	Choose Sometimes ✓	Choose Most ✓✓
Food Grouping: **Soups** Includes dry, canned and fresh	Many canned soups, broth or milk based	Most instant soups, plain or seasoned Some borscht if salt or Many canned soups, broth or milk based	Some soups without meat, or beans/lentils Some borscht if low in salt Most milk-based soups Some low-sodium canned soups	Some soups made with meat or beans/lentils Some borscht if it includes meat or beans/lentils Some milk-based soups Some low-sodium canned soups made with meat or beans/lentils
Nutrition Criteria	**ANY of the following:** Fat: 15 g or more Trans Fat: 0.2 g or more Sodium: more than 900 mg Iron: less than 5%	**ANY of the following:** Fat: 10 - 15 g Sodium: 600 - 900 mg	Iron: 5 - 10% **ANY item that passes the Least and Not Recommended, but does not pass the Most criteria**	**ANY item that passes the Not Recommended, Least, and Sometimes criteria** AND 1st ingredient must be a food group food (not counting water)
Food Grouping: **Candies, Chocolates, etc.**	Most regular packages	Most very small packages of candies/chocolates Very small portions of frozen novelties not based on milk or fruit ingredients Very small portions of dessert gelatins	None	None
Nutrition Criteria	Calories: 100 or more Sugar: 15 g or more Caffeine: 25 mg or more	Calories: fewer than 100 Sugar: less than 15 g May be artificially sweetened Caffeine: less than 25 mg	No qualifying criteria	No qualifying criteria

Candies, chocolates, etc. that are high in sugars and starches (natural or added) can leave food particles clinging to teeth that can put dental health at risk.
The BC Dental Public Health Committee suggests eating these clingy foods only at mealtimes,
and choosing at snack time foods that clear quickly from the mouth.
For more information on how food and beverage choices can affect dental health, see www.foodsmartbc.ca/health

Guidelines For Food and Beverage Sales In BC Schools
Nutrition Criteria for Each Food Grouping

	Not Recommended	Choose Least	Choose Sometimes ✓	Choose Most ✓✓
Food Grouping: **Energy Bars** Includes meal replacement bars, sports bars and snack bars	Super-sized bars Low protein bars	Bars with sugars as 1st ingredient Artificially sweetened bars Many "low-carb" bars	Most bars made with little whole grain, nuts, seeds, fruit	Some bars made with whole grains, nuts, seeds, fruit
Nutrition Criteria	**ANY of the following:** Calories: more than 300 Trans Fat: 0.2 g or more Protein: less than 4 g Caffeine: 25 mg or more	**ANY of the following:** Calories: 250 - 300 Fat: 10 g or more Protein: 4 - 6 g Sugars: are 1st ingredient Sugars: are 2nd + 3rd ingredient Caffeine: more than 15 mg and less than 25 mg	**ANY item that passes the Least and Not Recommended, but does not pass the Most criteria** May be artificially sweetened	**ANY item that passes the Not Recommended, Least, and Sometimes criteria** AND Fibre: 2 g or more

Energy bars high in sugars and starches (natural or added) can leave food particles clinging to teeth that can put dental health at risk.
The BC Dental Public Health Committee suggests eating these clingy foods only at mealtimes,
and choosing at snack time foods that clear quickly from the mouth.
For more information on how food and beverage choices can affect dental health, see www.foodsmartbc.ca/health

Guidelines For Food and Beverage Sales In BC Schools
Nutrition Criteria for Each Food Grouping

	Not Recommended	Choose Least	Choose Sometimes ✓	Choose Most ✓✓
Food Grouping: **Other Beverages (Non-Juice/ Non-Milk based)**	Most drinks with sugars as the 1st ingredient (not counting water) – e.g. iced teas, fruit 'ades', pops Most caffeinated drinks (e.g. regular tea, coffee, colas, and drinks with guarana, yerba, yerba mate) Most sport drinks* Most unfortified flavoured rice, soy or potato drinks Most hot chocolate mixes made with water	Water (flavoured or not) with artificial sweeteners or minimally sweetened Diet soft drinks and non-carbonated drinks (decaf) Most unfortified plain soy or potato drinks Some fortified flavoured (and most unfortified plain) rice drinks	Most fortified flavoured potato drinks and some fortified rice drinks Some unfortified soy drinks	Water, plain Sparkling/carbonated water or water with added flavours (no sugar or artificial sweeteners) Soda water Fruit/mint flavoured decaf, unsweetened teas Decaffeinated tea or coffee Most fortified plain potato drinks (see "Milk Beverages" for fortified soy drinks)
Nutrition Criteria	**ANY of the following:** Size: more than 600 mL Calories: more than 300 Trans Fat: 0.2 g or more Sodium: more than 300 mg Sugars: more than 16 g per 250 mL Sugars: more than 8 g per 250 mL portion IF there is less than 5% calcium (55 mg) per 250 mL portion Caffeine: 25 mg or more	**ANY of the following:** Sugars: 8 - 16 g per 250 mL portion IF there is 5 - 20% calcium (55-220 mg) per 250 mL OR Sugars: up to 8 g per 250 mL portion IF there is less than 5% calcium Caffeine: more than 15 mg and less than 25 mg Artificially sweetened AND there is less than 20% calcium (220 mg) per 250 mL portion	**ANY item that passes the Least and Not Recommended, but does not pass the Most criteria** Sugars: 8 - 16 g per 250 mL portion IF there is at least 20% calcium (220 mg) per 250 mL portion OR Sugars: up to 8 g per 250 mL portion IF there is 5 - 20% calcium (55-220 mg) per 250 mL portion Artificially sweetened IF there is at least 20% calcium (220 mg) per 250 mL	**ANY of the following:** Water, plain Sparkling/carbonated/flavoured waters (no sugars or artificial sweeteners) OR Sugars: up to 8 g per 250 mL portion IF there is at least 20% calcium (220 mg) per 250 mL portion

* Sport/electrolyte drinks are not recommended for routine sale in schools. However, the BC Community Nutritionists Council School Food Advisory Committee suggests that middle/secondary schools can make these drinks available for students participating in endurance or performance sports.

"Other Beverages" may provide excess liquid calories, caffeine, artificial sweeteners, or acids and other displace healthier food/beverage choices in students' diets. The BC Community Nutritionists Council School Food Advisory Committee suggests that portion sizes of "other beverages" (except plain and sparkling water) be limited to 250 mL or less for elementary schools and 360 mL or less for middle/secondary schools.

The BC Dental Public Health Committee suggests choosing plain water more often than "other beverages". Whether they contain sugars or not, almost all "other beverages" contain acids (natural or added) that may dissolve tooth enamel when sipped frequently. To avoid prolonged exposure, the committee recommends that only plain water be allowed in classrooms except at designated eating times. For more information on how food and beverage choices can affect dental health, see www.fooled.com/bc.ca

Guidelines For Food and Beverage Sales In BC Schools
Nutrition Criteria for Each Food Grouping

	Not Recommended	Choose Least	Choose Sometimes ✓	Choose Most ✓✓
Food Grouping: **Condiments & Add Ins**	Condiments or add-ins containing trans fat (from hydrogenated & partially hydrogenated oils, or from vegetable shortening) AND more than 0.2 g trans fat per serving		One or two condiments can be used to enhance the flavour of Choose Most and Choose Sometimes items: Herbs & Seasonings, garlic, pepper (no added salt): no limit Soy sauce: 2 - 5 mL Hot sauce: 5-10 mL Table salt: ¼ - ½ mL Soft margarine, butter: 5 – 10 mL Cream cheese or processed cheese spread (regular/lite): 5 - 15 mL Sour cream: 15 - 30 mL Cream: 5 - 15 mL Whipped cream (from cream): 15 - 30 mL Low fat spreads, dips, dressings: 5 - 15 mL Regular spreads, dips, dressings: 5 - 10 mL Oil for sautéing or dressing: 5 - 10 mL Ketchup, mustard, pickles, relishes, olives: 10 - 15 mL Horseradish: 10 - 45 mL Jarred salsa, sauerkraut: 10 - 30 mL Salad toppers (eg. bacon bits): 5 - 10 mL Sugars/honey: 5 - 10 mL Artificial sweeteners: 1 packet	

Appendix D

Type	Food	Energy Density	Cost	Calories per dollar	Dollars per 100kcal
Asian	Sumo Shrimp	0.52	8.69	53.28	1.88
Asian	Grilled Vegetables	0.47	4.49	72.38	1.38
Asian	Chicken Teriyaki, rice, veggies	1.28	7.95	86.67	1.15
Asian	Fried dumplings (9 pc)	3.41	6.95	245.04	0.41
Asian	2 Items with Chow Mein	1.59	5.95	224.87	0.44
Asian	Lunch box to go (3 items)	1.60	5.61	226.38	0.44
Asian	Buffet	1.44	7.45	135.44	0.74
Asian	Dinner for 1	1.44	9.50	106.21	0.94
Asian	Special #1 (With meat)	1.20	5.69	136.38	0.73
Asian	Special #2 (without meat)	1.12	4.79	141.96	0.70
Asian	Veggie Bento Box (tempura, soup, salad, rice, peanut sauce, stir fry)	0.71	9.50	70.84	1.41
Burger	Teen burger	2.17	3.59	128.13	0.78
Burger	Large Fries	3.21	1.99	251.26	0.40
Burger	Reg Fries	3.54	1.59	251.57	0.40
Burger	A&W Root Beer Large	0.48	1.79	167.60	0.60
Burger	Chubby Chicken Burger	2.54	4.29	104.90	0.95
Burger	Cubby Chicken Strips (3)	2.50	4.19	71.60	1.40
Burger	Whopper with Cheese	2.38	3.99	182.96	0.55
Burger	Large Fries	3.14	1.99	251.26	0.40
Burger	Regular Fries	3.10	1.89	190.48	0.53
Burger	Chicken Tenders (6pc)	2.63	2.99	83.61	1.20
Burger	BK Veggie burger	1.74	3.39	76.70	1.30
Burger	Canadian Burger	2.22	4.49	178.17	0.56
Burger	Veggie Pita	1.56	4.29	106.06	0.94
Burger	Small Fries	3.02	2.79	151.61	0.66
Burger	Regular Fries	2.96	3.29	179.94	0.56
Burger	Large Fries	2.91	3.69	224.66	0.45
Burger	Jumbo Fries	3.41	4.09	283.62	0.35
Burger	Poutine (reg)	2.39	4.59	143.36	0.70
Burger	Chicken BLT salad	1.52	5.99	115.19	0.87
Burger	Sour Cream and Chives potato	1.07	1.39	251.80	0.40
Burger	Reg Fries	3.10	1.39	316.55	0.32
Burger	Biggie Fries	3.08	1.59	308.18	0.32
Burger	Great Biggie Fries	3.11	1.99	296.48	0.34
Burger	Jr. Hambuger deluxe	1.92	1.29	248.06	0.40
Burger	Crispy chicken nuggets (5pc)	2.93	1.99	110.55	0.90
Cafeteria	Cheeseburger	2.73	3.95	167.85	0.60
Cafeteria	Fries	3.38	1.55	381.29	0.26
Cafeteria	Turkey and Cheese Sandwich	2.69	3.69	148.51	0.67
Cafeteria	1 Slice 4 cheese pizza	3.42	3.50	225.71	0.44
Cafeteria	"Healthy Choice Bowl": 7-grain and white rice, zucchini, white chicken, thai spicy sauce	1.08	4.95	88.69	1.13

Type	Food	Energy Density	Cost	Calories per dollar	Dollars per 100kcal
Cafeteria	Turkey Breast Sandwich	0.98	3.95	86.08	1.16
Cafeteria	Muffin	2.77	1.10	380.00	0.26
Cafeteria	Sushi (6pc)	1.25	6.25	82.24	1.22
Cafeteria	Tossed Salad	0.16	2.25	10.22	9.78
Cafeteria	Club (bacon) Quesadilla (with sour cream and salsa)	1.88	5.37	117.69	0.85
Cafeteria	Fruit Cup	0.45	1.75	61.14	1.64
Cafeteria	Fruit and Yogurt	0.85	3.75	70.93	1.41
Cafeteria	Apple	0.59	0.80	102.50	0.98
Cafeteria	Perogies with Kolbasa	2.26	5.39	186.83	0.54
Cafeteria	Macaroni and Cheese	1.48	5.29	174.10	0.57
Cafeteria	fruit (apple)	0.59	0.89	92.13	1.09
Cafeteria	baked ravioli and veggies	1.34	5.49	142.26	0.70
Cafeteria	sandwich (turkey)	0.98	4.99	68.14	1.47
Cafeteria	Whole wheat pasta (side)	1.24	1.50	86.67	1.15
Cafeteria	Burger	2.34	5.89	97.62	1.02
Cafeteria	Salad Greens	0.17	1.09	15.60	6.41
Cafeteria	Turkey, ham and Cheese Sandwich	2.69	4.19	131.74	0.76
Cafeteria	Pizza	2.70	2.49	202.41	0.49
Cafeteria	Pizza	1.59	8.95	61.68	1.62
Cafeteria	Panini	1.55	7.95	74.84	1.34
Cafeteria	Cookie	4.88	1.75	259.43	0.39
Cafeteria	Raisin Bran Muffin	3.48	1.50	283.33	0.35
Cafeteria	Salad Greens	0.16	1.29	12.40	8.06
Cafeteria	Potato salad	1.43	1.29	110.85	0.90
Cafeteria	Apple	0.59	0.95	86.32	1.16
Cafeteria	Fruit Cup	0.46	2.29	59.83	1.67
Cafeteria	Veggie Cup	0.28	2.29	21.40	4.67
Cafeteria	Pasta (capeletti, vegetables, tomato sauce)	1.50	5.99	230.38	0.43
Cafeteria	Banana	0.92	0.75	141.33	0.71
Cafeteria	Apple	0.59	0.75	109.33	0.91
Cafeteria	Turkey Provolone Sandwich	2.18	5.00	108.40	0.92
Cafeteria	Morning Glory Muffin	2.77	1.50	262.50	0.38
Cafeteria	Pasta	1.04	5.25	162.48	0.62
Cafeteria	Pasta with chicken	1.11	6.25	153.44	0.65
Coffee	Veggie Panini	1.75	4.62	67.53	1.48
Coffee	Raisin Bran Muffin	3.12	1.55	307.74	0.32
Coffee	Apple	0.59	0.95	86.32	1.16
Coffee	Whole wheat bagel	2.75	1.75	174.29	0.57
Coffee	Bagel	2.64	1.40	211.43	0.47
Coffee	egg salad sandwich	1.60	4.97	59.36	1.68
Coffee	Rustic Vegetable Sandwich	2.33	5.50	68.18	1.47
Coffee	Veggie Roll	4.26	1.75	226.29	0.44
Coffee	Sausage Roll	4.83	1.75	256.57	0.39

Type	Food	Energy Density	Cost	Calories per dollar	Dollars per 100kcal
Coffee	Puffed Wheat Square	4.16	1.50	390.67	0.26
Coffee	Berry Bran Muffin	1.78	1.87	180.75	0.55
Coffee	Chocolate Hazelnut Biscotti	3.92	2.10	119.52	0.84
Coffee	Butter Pecan Tart	4.09	2.66	167.67	0.60
Coffee	Whole Wheat Scone w/ cheese	3.73	2.25	225.33	0.44
Coffee	Poppycock	4.00	3.00	112.00	0.89
Coffee	1 Donut (avg for all donuts: Range 200-350)	2.60	0.75	346.67	0.29
Coffee	6 Donuts	2.60	3.75	416.00	0.24
Coffee	12 Donuts	2.60	5.50	567.27	0.18
Coffee	Regular Coffee	0.25	1.17	64.10	1.56
Coffee	Vegetable Sandwich (reg)	1.66	2.99	113.71	0.88
Coffee	Vegetable Sandwich (large)	1.66	4.79	126.30	0.79
Coffee	Ham and Swiss Sandwich (reg)	1.77	3.99	110.28	0.91
Coffee	Ham and Swiss Sandwich (large)	1.77	5.79	122.35	0.82
Coffee	Cappuccino (med)	0.89	1.40	178.57	0.56
Coffee	Coffee (med, reg)	0.27	1.17	64.10	1.56
Coffee	Donut (avg) per 1	2.60	0.75	346.67	0.29
Coffee	Donut (avg) 1/6	2.60	0.63	416.00	0.24
Coffee	Donut (avg) 1/12	2.60	0.46	567.27	0.18
Coffee	Timbits (avg) per 1	3.10	0.15	413.33	0.24
Coffee	Timbits (avg) 1/10	3.10	0.15	413.33	0.24
Coffee	Timbits (avg) 1/20	3.10	0.13	496.00	0.20
Coffee	Timbits (avg) 1/40	3.10	0.12	522.11	0.19
Coffee	Cookie (avg) per 1	4.57	0.40	400.00	0.25
Coffee	Cookie (avg) 1/6	4.57	0.33	482.41	0.21
Coffee	Cookie (avg) 1/12	4.57	0.25	642.14	0.16
Coffee	Cookie	4.67	1.45	164.14	0.61
Coffee	Cake	3.61	2.95	245.42	0.41
Coffee	1 Donut	4.26	0.80	473.75	0.21
Pizza	1 pizza (personal)	2.11	5.50	102.18	0.98
Pizza	Spinach salad (w/o drsg)	1.16	5.25	37.71	2.65
Pizza	Spinach salad (w/ drsg)	1.57	5.25	55.24	1.81
Pizza	Veggie personal pizza	2.11	8.95	120.89	0.83
Pizza	1 Slice pizza	2.59	3.74	147.06	0.68
Pizza	Curry and Rice (Thai)	1.52	4.99	182.36	0.55
Pizza	Pizza Slice	2.76	2.99	223.41	0.45
Pizza	1 Slice 12" pizza (delivery)	2.37	2.06	107.06	0.93
Pizza	1 Slice 14" pizza (delivery)	2.44	1.97	162.44	0.62
Pizza	1 Slice 14" pizza	2.44	1.50	213.33	0.47
Pizza	Classic Super (1 walk-in slice)	2.03	3.25	196.92	0.51
Pizza	Stuffed Sandwich	2.00	3.99	85.21	1.17
Sandwich	Apple	0.59	0.70	117.14	0.85
Sandwich	Chocolate muffin	4.18	1.17	666.67	0.15

Type	Food	Energy Density	Cost	Calories per dollar	Dollars per 100kcal
Sandwich	Chef's Salad (lettuce, tomato, egg, cheese)	1.33	3.97	85.89	1.16
Sandwich	Tuna Sandwich	2.18	4.67	82.44	1.21
Sandwich	Falafel (reg)	1.19	4.59	75.38	1.33
Sandwich	Falafel (large)	1.17	5.79	84.97	1.18
Sandwich	Flat baked pita (pepperoni)	1.16	4.79	101.46	0.99
Sandwich	Veggie bagel sandwich w/ cheese	1.87	3.89	117.74	0.85
Sandwich	muffin	4.18	1.35	577.78	0.17
Sandwich	fruit (apple)	0.59	0.75	109.33	0.91
Sandwich	Chicken salad (reg) (With Dressing)	1.81	5.25	114.67	0.87
Sandwich	Jacket Potato (M)	1.44	3.25	136.62	0.73
Sandwich	Jacket Potato (L)	1.32	3.95	153.67	0.65
Sandwich	Vegetarian Lasagna	1.00	4.35	96.78	1.03
Sandwich	Fruit Salad	0.44	2.50	42.40	2.36
Sandwich	Chicken Caesar Pita	2.05	4.35	93.33	1.07
Sandwich	Greek Salad	0.46	5.00	22.80	4.39
Sandwich	Apple	0.59	1.00	82.00	1.22
Sandwich	Chocolate Chip Muffin	1.08	2.00	100.00	1.00
Sandwich	Chicken breast sandwich	1.52	4.95	47.68	2.10
Sandwich	Cheese Sandwich	2.20	4.67	139.61	0.72
Sandwich	Caesar Salad (small)	1.80	3.97	64.48	1.55
Sandwich	Veggie Samosa	1.69	1.25	135.20	0.74
Sandwich	6" Assorted	1.56	3.59	77.99	1.28
Sandwich	6" BLT	1.97	4.19	62.05	1.61
Sandwich	12" Assorted	1.56	5.99	93.49	1.07
Sandwich	12" BLT	1.97	6.39	81.38	1.23
Sandwich	6' Veggie sub	1.54	2.49	72.29	1.38
Sandwich	12" veggie sub	1.54	3.99	90.23	1.11
Sandwich	Wrap	1.65	5.29	60.49	1.65
Sandwich	Classic (small)	1.56	3.60	77.78	1.29
Sandwich	Classic (reg)	1.56	5.69	98.42	1.02
Sandwich	Premium (small)	1.44	4.59	56.64	1.77
Sandwich	Premium (reg)	1.44	6.99	74.39	1.34
Sandwich	Veggie Pita	1.53	4.99	105.01	0.95
Sandwich	Mediterranean Salad (w drsg)	1.12	4.99	72.55	1.38
Sandwich	Assorted Pita w/ cheese, light mayo and secret sauce	1.81	5.48	117.17	0.85
Sandwich	6" BMT	1.85	4.29	106.29	0.94
Sandwich	6" Subway Club	1.11	4.69	55.44	1.80
Sandwich	12" BMT	1.85	6.79	134.32	0.74
Sandwich	12" Subway Club	1.11	7.19	72.32	1.38
Sandwich	Cookie	4.57	0.63	333.33	0.30
Sit-down restaurant	Veggie Calzone	2.06	4.00	162.50	0.62

Type	Food	Energy Density	Cost	Calories per dollar	Dollars per 100kcal
Sit-down restaurant	Pasta (small)	1.07	3.25	149.85	0.67
Sit-down restaurant	Caesar Salad (small)	1.75	2.25	138.67	0.72
Sit-down restaurant	Jim Beam's bourbon burger (113g meat) and fries	2.68	5.95	193.78	0.52
Sit-down restaurant	Spinach salad (lg)	0.98	6.95	34.24	2.92
Sit-down restaurant	Hummus plate	1.39	3.95	92.66	1.08
Sit-down restaurant	RATT classic burger (84.5g meat) & fries	2.68	4.95	220.20	0.45
Sit-down restaurant	Cajun chicken cheddar sandwich with Tossed Salad	2.40	11.50	91.91	1.09
Sit-down restaurant	2 Cheese Empanadas	3.59	5.80	102.07	0.98
Sit-down restaurant	Veggie Wrap	1.85	5.88	83.33	1.20
Smoothies	Vegetarian Sandwich	1.88	4.50	90.22	1.11
Smoothies	Smoothie (Large)	0.64	4.25	52.71	1.90
Smoothies	Smoothie (Regular)	0.64	3.75	42.67	2.34
Smoothies	Smoothie (Small)	0.64	3.25	39.38	2.54
Smoothies	Strawberry sunshine	0.61	4.85	74.85	1.34
Smoothies	Terminator	0.59	5.15	68.93	1.45
Smoothies	Mediterranean Panini	1.87	2.75	80.36	1.24
Smoothies	Reg Smoothie (12oz)	0.58	3.79	46.17	2.17
Smoothies	Large Smoothie (24 oz)	0.58	4.06	86.21	1.16
Smoothies	Panini	2.18	4.99	120.24	0.83
Smoothies	Feta, chicken, Veggies, brown rice	1.14	5.65	144.25	0.69
Smoothies	Pineapple Shake	0.75	4.25	76.00	1.32